ELECTRICAL WORLD

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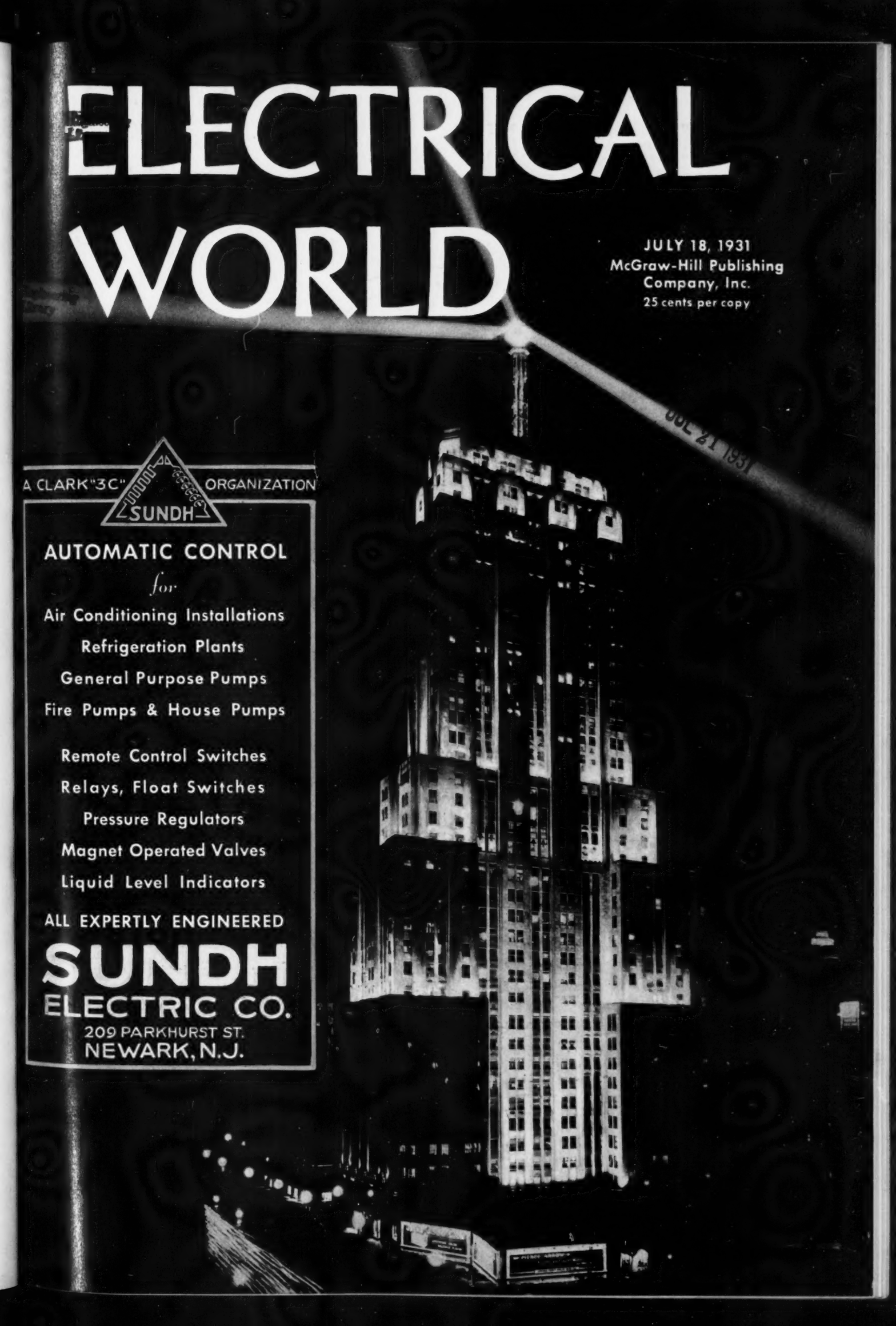

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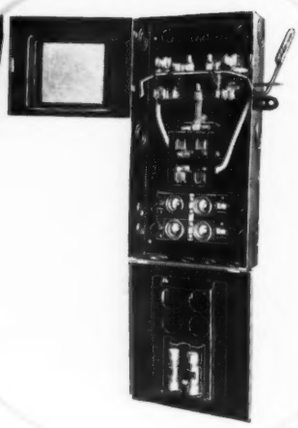

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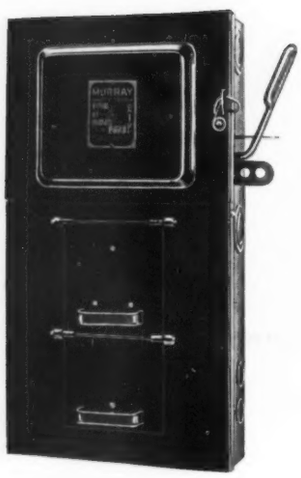

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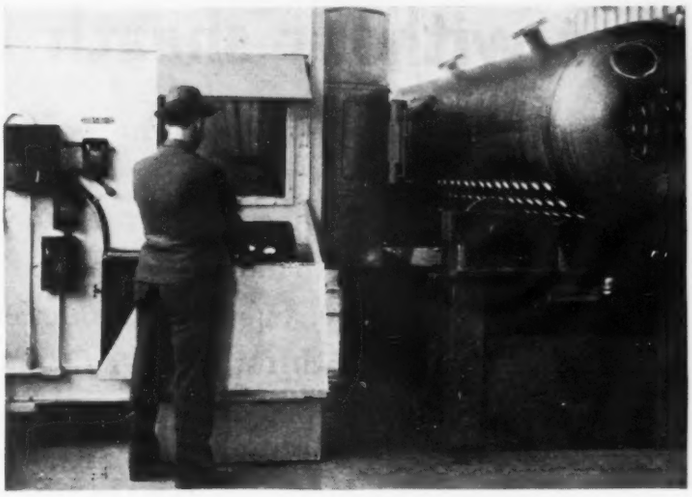

X-ray tests welded boilers

JULY 18, 1931

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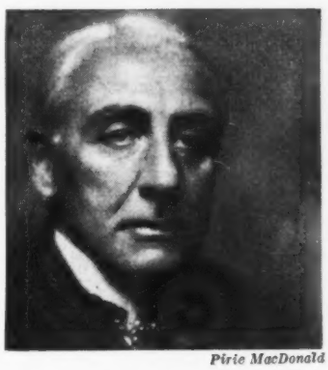
ELECTRICAL WORLD

for the Week Ending

July 18, 1931

Cities Service wins a decision in Kansas dispute



Pirie MacDonald

A favorite fiction of critics of the power industry is the charge that inflations of capitalization cause excessive rates for power. They overlook the primary fact that rates are based upon property values and not upon capitalization.

MARTIN J. INSULL
President
Middle West Utilities Co.

—**Range wiring costs reduced** by introduction of complete new service assembly. Savings on Niagara Hudson system estimated at 30 per cent as plan is made effective—*p. 118.*

—**Difficult lighting problems** solved in securing desired effects for New York's new Empire State Building. Experimental analysis preceded actual construction. Unusual effects were obtained here—*p. 106.*

—**Doherty vs. Kansas continues** with acrimonious displays. District Court declares the law under which banking department sought to bar stock sales to be unconstitutional—*p. 90.*

—**Costs of customers' accounts** for both opening and closing procedures analyzed in detail. Tenney property shows $1.23 for opening and $0.99 for closing as average figures—*p. 116.*

Ross back as Seattle power head

—**Mayor who ousted Ross loses** in election this week and City Council promptly recalls former superintendent of city light department, who, it is rumored, was the election issue—*p. 90.*

—**British railroads are skeptical** of feasibility of comprehensive electrification plan involved in Lord Weir's report. Suburban lines viewed as likely field, but that's about all—*p. 94.*

Has New York the perfect tie line?

—**Lightning-proof transmission** was the ideal which engineers set for themselves in designing the Niagara Hudson-New York Edison tie. Time alone will tell the story, but the plan bristles with ideas—*p. 100.*

—**Aluminum resists power arcs** well in comparative tests with copper tubing. Experiments show that arcs on aluminum are comparatively unstable and that combustion does not take place where flashovers occur—*p. 104.*

N.E.L.A. committee chairmen announced

Cities Service Wins a Victory in Kansas as District Court Kills Stock Ban

BY a decision of the Shawnee County (Kansas) District Court, declaring unconstitutional the law under which the State Banking Department barred the sale of certain classes of Cities Service Company stock, Henry L. Doherty won the first victory in the conflict which began early this month and involves Henry L. Doherty, Governor Woodring, the Kansas City *Star*, the Kansas State Banking Department and many others. (See ELECTRICAL WORLD, July 11, 1931, page 82.) The ban has been lifted against Cities Service securities.

The court ruled that the statute authorizing revocation of sale of listed stocks defined no limitation or avenue of consideration, and delegated unwarranted and improper power to the "blue-sky" commissioner. Other sections of the law were held to be valid, but the verdict restored Cities Service stocks to the same basis as other securities defined in the general law.

Attorney-General Boynton, acting for the State Bank Commissioner, under whose authority the "blue-sky" department operates, indicated that he would appeal to the State Supreme Court.

Carl Newcomer, "blue-sky" commissioner, has denied under cross-examination that he conferred with Governor Harry Woodring on the action against the Doherty interests.

A libel suit alleging $12,000,000 damages has been filed against the Kansas City *Star* by attorneys for Mr. Doherty.

Cities Service comments

Following the decision of the District Court a press release by the Cities Service Company stated:

"There was no reason to believe that the ban on our securities would be upheld. This was made clear in the legal arguments at the injunction hearing yesterday when the Kansas Attorney-General, in attempting to defend the arbitrary act of the Commissioner, stated that Cities Service stock had not been barred from the state.

"All the evidence points to the fact that the hand of the Kansas City *Star*, Governor Woodring and the other politicians it controls are back of this fight. The president of the Kansas City Star Company has openly admitted that his son-in law is engaged in the gas business, and while he says that the *Star* officials, themselves, are not in the gas business, it would be 'no one's damn business if they were.'

"This admission bears out the charge made in Mr. Doherty's suit that the object of the Kansas City *Star* is to injure Cities Service Company so that their own project for supplying gas to the Kansas City territory would be free of competition."

Kansas City Star denies interests in gas companies

George B. Longan, president of the Kansas City Star Company, replied that "the charge that the *Star* or any of its executives is directly or indirectly interested in any gas company whatever is preposterous and untrue."

"The fact that my 28-year-old son-in-law is one of the lawyers for a company that has been looking over the Omaha field, where the Doherty companies are not in business, is the only foundation for the Doherty assertion," Mr. Longan said.

▼

Hoover Dam Power Contracts Left Open

AN EXTENSION OF FOUR MONTHS in which to ratify Hoover Dam power contracts with the government has been granted Pasadena, Calif., and ten other allottees by Ray Lyman Wilbur, Secretary of the Interior, according to Harold P. Huls, Pasadena city attorney and chairman of the legal committee of smaller city allottees. Other cities in this group are Burbank, Glendale, Beverly Hills, Fullerton, Anaheim, Newport Beach, Riverside, Colton, Santa Ana and San Bernardino. According to the announcement power contracts of the smaller allottee cities may be signed at any time now, but will not be binding unless ratified by a two-thirds vote of the electors of the interested communities on or before November 15, 1931.

▼

Ross Returns to Seattle as Light Department Head

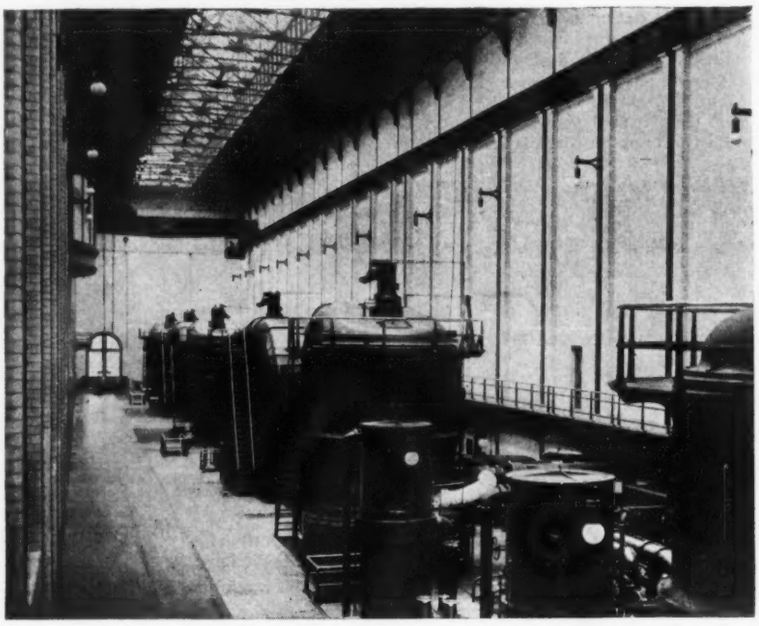
SEATTLE, EVER AN UNEASY SEAT of government and glory, has suffered another municipal upset; incident to which J. D. Ross returns as superintendent of the city's light department after a summary dismissal in March of this year.

Mr. Ross, who has long been prominent in engineering and has been the leading spirit in Seattle's municipal plant development for 25 years, stated: "The success of the recall serves notice to friends and foes of public ownership that Seattle is definitely committed to protection and progress for its city-owned utility. City Light can now go on to greater things, its future and credit safer after this election."

The immediate cause of the upset of

▼ ▼ ▼

QUARRY STREET STATION SOON WILL BE NO MORE



Twenty-two years ago the first 14,000-kw. generating unit was installed in Quarry Street station, Chicago. Soon the station had 84,000 kw. installed. Today it represents only one-twelfth of Commonwealth Edison capacity, obsolescence pervades it, and George Brodie, its new chief engineer, has the melancholy task of bringing its activities to a close.

AMSTERDAM WHITE WAY SUGGESTS BROADWAY

—Underwood & Underwood

When it comes to electric illumination Rembrandt Square in the Dutch metropolis is not so far behind her American descendant—the New Amsterdam of three centuries ago.

▼ ▼ ▼

W. Chester Morse as superintendent and the resumption of Mr. Ross to that office was the city election this week, in which Mayor Frank Edwards was defeated. Robert Harlin, president of the City Council, is acting Mayor. The dismissal of Mr. Ross by Edwards led to the charges of malfeasance against the former Mayor, who was recalled by a vote of 35,637 to 21,836.

▼

German Electric Congress Is Held in Frankfort

CELEBRATING BOTH the semi-centennial of the founding of the German Electrotechnical Association (V.D.E.) and the fortieth anniversary of the opening of the international electrical exposition in Frankfort in 1891, a convention representing all branches of the German electrical industry, and attended also by many foreign visitors, was held in that city on June 21-23. Frankfort has been intimately connected with electrical progress, and a historical flavor was appropriately given to the convention.

The exposition of 1891 was the occasion for the first long-distance transmission of a block of power by alternating current, 225 hp. being sent from the power plant at Lauffen, 110 miles distant, at 25,000 volts and with an efficiency of 75 per cent. Oskar von Miller, the engineer whose tenacity of purpose made this possible and who has remained in the forefront of progress in that field, attended the June convention and reviewed some of the difficulties of the early days. He indicated that definite plans are now in view for a coordinated power system to serve the entire nation.

▼

Pennsylvania Commission Upholds Optional Rates

ADJUDICATING A CASE in which Spear & Company of Pittsburgh sought reparation from the Duquesne Light Company for the difference between bills rendered under one schedule and bills which might have been rendered for the same service under another schedule, the Pennsylvania Public Service Commission recently declared that optional or alternative rate schedules are proper for utility companies to adopt and that the utility is not duty-bound to determine for each customer which schedule will be more advantageous to him. The commission said in part:

Complainant contends that for any particular service there can be only one rate properly applicable and that optional rates are improper and discriminatory, except where special arrangements are made in regard to service under conditions of quite unusual nature. . . . However, the practice of filing rates in the alternative under what is known as optional provisions of the tariff is widespread and well established, not only in the electrical industry but also in other lines of public service. Rate structures are devised to meet conditions applying to the greatest number of people, but it is scarcely possible, particularly in electric power schedules, to devise a method of calculating rates which does not give some consumers unusual benefits or inflict some hardships upon others.

It has, therefore, become common for companies to have two or more schedules of rates for a given service, the one or the other to be adopted for a given period as a method of calculating the charge for the service rendered on what may be the most reasonable basis under the circumstances. The commission recognizes the right of respondent to put into effect optional or alternative rates that are not discriminatory or otherwise objectionable.

Complainant contends further that if optional rates are proper, it is the duty of the company to calculate which will be the cheapest for each consumer and to bill him upon that basis. In practice such a procedure would be well-nigh impossible. A utility has the duty to make proper classifications of its service and to prescribe rates accordingly, but having done this and having made all proper information available to its patrons, its obligation has been met.

▼

Japan Tightens Regulation of Its Power Industry

STRICTER CONTROL AND SUPERVISION by the Japanese Government over the nation's electric power industry, as well as easier financial accommodation for electric enterprises, is provided in a recently revised law.

According to reports to the U. S. Department of Commerce, the revisions of the law provide that the competent authorities may, in the public interest,

create, change or use in common electric power equipment, divert the supply of electricity and expand or contract the rate of construction work in accordance with the exigencies of a national network of power lines. Enterprises cannot dissolve, suspend, discontinue or transfer the whole or part of their works or amalgamate with other works without the permission of the competent minister. Enterprises shall obtain the permission for newly establishing or changing the terms of supply. The minister also has the right to withdraw the whole or part of authority granted to electric enterprises and may even change the directors of a company in such special cases as indicated in the law. An electric committee is to be established as a consultative organ to the minister for the proper application of the law.

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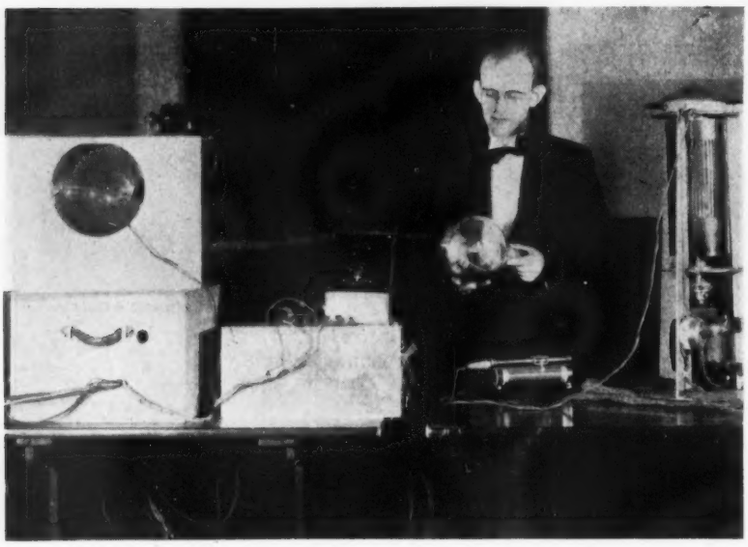
"ELECTRIC EYE" FOR AIRSHIPS LANDING IN FOG



W. F. Westendorp, General Electric, demonstrates. The upper box, containing a photo-electric tube and rotating mirror, has two windows corresponding to windows on the airplane tail. The lower box contains the amplification unit. Alongside are the batteries, and on top the remote indicator. At the right is the small "beacon" used in demonstration. Airports would have large neon beacons using 1,000-cycle current.

▼ ▼ ▼

N.E.L.A. Committee Chairmen for 1931-32

APPOINTMENT OF N.E.L.A. committee chairmen for the association year 1931-32 is almost complete. The list as given out from the secretary's office of the National Electric Light Association follows:

SPECIAL NATIONAL COMMITTEES

Charles A. Coffin Prize—J. F. Owens.
Codes and Standards—Irvin W. Day.
Constitution and By-Laws—R. F. Pack.
Exhibition—E. W. Goldschmidt.
Finance—Sidney Z. Mitchell.
Lamp—Frank W. Smith.
Prize Awards—Frank W. Smith.
Public Policy—P. S. Arkwright.
Railway Electrification—Not yet appointed.
Rate Research—F. A. Newton.

GENERAL NATIONAL COMMITTEES

Civic Development—Harvey C. Couch.
Educational—Not yet appointed.
Insurance—W. H. Sawyer.
Membership—A. Jackson Marshall.
Motor Transportation—Not yet appointed.
Rural Electric Service—H. M. Weathers.

ACCOUNTING NATIONAL SECTION

Executive—J. H. Lobban.
Advisory Council—Franklin Heydecke.
Budget—C. E. Weger.
Classification of Accounts—H. C. Hasbrouck.
Customers' Records—F. J. Moylan.
Exhibit—W. A. O'Neill.
Fixed Capital—S. L. Ferguson.
General Records—C. E. Kohlhepp.
Geographic Division Representatives—C. L. McGowan.
Purchasing and Storeroom—S. M. Smallpage.
Statistics—E. J. Fowler.

COMMERCIAL NATIONAL SECTION

Executive—T. O. Kennedy.
Commercial Policy—T. O. Kennedy.
Commercial and Industrial Power and Heating Bureau—W. H. Sammis.
Commercial Cooking—B. M. Riker.
Electric Truck—Not yet appointed.
General Power—H. C. Thuerk.
Industrial Heating—J. L. Faden.
Lighting Bureau—Clarence Law.
Commercial and Industrial Lighting—J. M. Shute.
Electrical Advertising—L. W. McLellen.
Domestic Lighting—R. J. Malcomson.
Outdoor Lighting—S. W. Thompson.
Merchandising Bureau—C. J. Eaton.
Domestic Electric Range—Not yet appointed.
Farm Equipment—H. E. Dexter.
Merchandise Sales—H. A. Keys.
Water Heating—E. L. Hinchliss.
Refrigeration—J. E. Davidson.
Plan—A. C. Watt.
General Bureau—T. O. Kennedy.
Customer Relations—H. T. East.
Wiring Sales—E. A. Brand.

ENGINEERING NATIONAL SECTION

Executive—A. H. Kehoe.
Accident Prevention—W. A. Buchanan.
Electrical Apparatus—George Sutherland.
Foreign Systems Co-ordination—M. D. Hooven.
Hydraulic Power—Byron E. White.
Meter—E. A. LeFever.
Overhead Systems—Merrill W. DeMerit.
Power Systems Engineering—S. M. Dean.
Prime Movers—Alfred Iddles.
Lighting and Marking of Airways (special)—E. C. Stone.
Research (special)—Alex D. Bailey.
Underground Systems—C. T. Sinclair.

PUBLIC RELATIONS NATIONAL SECTION

Executive—D. C. Green.
Advertising and Publicity—Joseph B. Groce.
Co-operation with Educational Institutions—John F. Gilchrist.
Customer Ownership—James B. Black.
Employee Information—Stanley Quinn.
Industrial Relations—A. J. Farre.
Public Speaking—H. S. Metcalfe.
Relations with Financial Institutions—H. M. Addinsell.
Women's—Miss Clara Zillessen.

▼

Connecticut Commission Clear of Leavitt Charges

MEMBERS OF THE Connecticut State Public Utilities Commission are not only clear of charges of material neglect of duty, but have been described, in a Superior Court decision, as having employed "wisdom, judgment, foresight and industry of high character" in their duties.

The decision dismissing ouster action was handed down early this week by Judge Alfred C. Baldwin of the Superior Court. Attorney-General Warren G. Burrows has announced that he does not plan to appeal to the Supreme Court.

The court action, brought by the Attorney-General against Public Utilities Commissioners Richard T. Higgins and Joseph W. Alsop, charged material neglect of duty in failure to comply with the statutory provisions requiring elimination of one grade crossing a year for every 50 miles of railroad in the state. In the trial counsel for the defendants contended the financial condition of the railroads had prevented their carrying out the statutory requirements.

Professor Leavitt, who had originated and pushed the battle, sat at the hearing as "friend of the court."

▼

Hoover Appoints Board for Muscle Shoals Survey

FEDERAL APPOINTEES TO SERVE on the joint federal and state commission to determine a method for handling the power and nitrate plants on the Tennessee River have been announced by President Hoover. These are: Edward A.

O'Neal of Alabama, president of the American Farm Bureau Federation; Col. Harley B. Ferguson of the Army Engineers, and Col. Joseph I. McMullen of the judge advocate-general's department.

The Governors of Alabama and Tennessee, the states most vitally affected by the disposition of the Muscle Shoals plants, have already designated their representatives, under legislative authorization.

Alabama will be represented by W. F. McFarland of Florence, J. N. Duncan of Auburn and S. F. Hobbs of Selma and Tennessee by Mercer Reynolds of Chattanooga, Vance J. Alexander of Nashville and W. A. Caldwell of Jackson.

The Muscle Shoals Commission is expected to devise some plan for handling the power properties, to be presented to the next Congress, which assembles in December.

▼

Right to Merchandise Up for Test in Texas

ATTORNEY-GENERAL JAMES V. ALLRED has filed suit in the District Court at Austin to test the legal right of public utility companies to engage in the business of selling equipment and supplies connected with their utility operations.

The petition asks that the United Light & Power Company and the American Light & Traction Company be enjoined from doing business in Texas; that the charter of the San Antonio Public Service Company of San Antonio be forfeited, and that an injunction be issued restraining it from doing a merchandising business.

Mr. Allred states that under Texas statutes no private corporation can be chartered for the purpose of conducting more than one separate and distinct business and that merchandising is a separate business. He alleges that notwithstanding the San Antonio company had unlawfully engaged in the business of selling goods, wares and merchandise, it paid no revenue in the way of franchise, charter or license fees. He points out that other merchandising corporations must pay fees.

It is further stated in the petition that such a condition tended to result and had resulted in the elimination of competition of private individuals and of private corporations engaged in the mercantile business, and in effect constituted the licensing of unfair competition by the State of Texas.

In a statement replying to the charges of Attorney-General James V. Allred, W. B. Tuttle, president of the defendant company, said that no notice or warning was ever given by the Attorney-General or any other state officer that the law was being violated.

"The action of the Attorney-General in bringing a suit against the company comes as a surprise, as the company had never been notified by the Attorney-General, or any other authority, that there was any question as to its rights to sell gas or electrical appliances," Mr. Tuttle said.

"The company has openly engaged in this business for a considerable time in the belief that it was amply within its corporate rights in so doing, and that it was contributing to the welfare of its customers by an active campaign to get the best and most economical appliances in use, and that it was contributing both to its own welfare and the welfare of the community by increasing the number of customers on its lines.

"The company will produce records to show that it has not monopolized the field in the sale of electric and gas appliances and fixtures, as alleged in the petition.

"The company's books show that in 1929 there were 5,000 new homes connected up for gas and during that period the local utility company sold only 450 gas ranges, while in 1930 there were 2,200 new connections and 410 ranges were sold."

▼ ▼ ▼

REMOVING STUMPS WITH ELECTRIC VACUUM CLEANER

By substituting an eight-tube attachment for the dust bag of a vacuum cleaner, ordinary garden hose under such forced draft will speed the burning of half-buried tree stumps. An average large stump becomes ashes in about ten hours. In western Washington logged-off areas are cleared in this way; energy from Puget Sound Power & Light Company.

▼ ▼ ▼

Indiana Commission Wins Martinsville Case

A DECISION ADVERSE to the contentions of the Wabash Valley Electric Company has been arrived at by Albert Ward, special master appointed by a federal court, in the Martinsville (Ind.) rate case. Mr. Ward recommends dissolution of the temporary injunction which has prevented the rates fixed by the Indiana Public Service Commission from going into effect and the dismissal of the utility company's suit. He holds that the commission's rates would give the company much more than 7 per cent return and reduces the valuation of the Martinsville property from the $135,402 claimed by the utility to $102,947, which is $15,947 more than allowed by the commission.

The commission also is upheld in its ruling that it is not necessary to consider the value of interconnecting lines in order to determine rates for one locality. Mr. Ward holds instead that a proportionate share of the entire property of the Wabash Electric Company, which serves eleven communities and 50 cities in the state, should be allocated to Martinsville.

NEW WATSONVILLE (CALIF.) OFFICE OF COAST COUNTIES GAS & ELECTRIC

Floodlighting the building takes 20 kw. Ten lamps are hidden in the shrubbery, seven are erected on a tall pole diagonally across the street, one is on the roof of a neighboring filling station, four are on the south side of an adjoining building and three on the back slope of the roof. Two of the latter shine on the tower over the lobby and the third lights the garden and space in the rear.

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British Roads Skeptical About Electrification

IN VARIOUS QUARTERS statements have recently been published to the effect that the British railroads have accepted the principle of the Weir report regarding the electrification of all the main lines in the United Kingdom. London advices, however, say that this is not their true position, and that though the railroads consider the problem of electrification to have been dealt with ably in the committee's report, the scheme has not received the support of traffic experts even in principle.

The reply to be sent to the Minister of Transport, Herbert Morrison, stating the views of the companies, is under consideration by the general managers' staff conference and will be submitted to each of the railroad boards before it is dispatched. In railroad circles it is held that electrification depends to a great extent upon the cost at which energy can be supplied, and it is contended that there is no guarantee that the rates will be those anticipated when the electricity bill passed Parliament. It is pointed out, too, that the Weir committee did not mention the fact that, under the scheme suggested, all sidings which are the property of industrial firms would have to be electrified at the cost of the owners. Electrification of suburban lines, it is admitted, is bound to come. That, however, is regarded as a very different proposal from the one embodied in the Weir scheme.

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St. Louis Hearings Close; Commission Deliberates

THE MISSOURI PUBLIC SERVICE COMMISSION now has under advisement the rate reduction case instituted by the city of St. Louis, Mo., against the Union Electric Light & Power Company which was begun in April, 1928. The final arguments in the case have been heard.

The city has contended that the earnings of the company are excessive both for the system as a whole and especially in St. Louis. It has asked for a revision of rates that will reduce the light and power bills of domestic users in St. Louis upward of $1,000,000 a year.

The company has contended that no reduction in domestic rates is warranted at this time and that a change in the rate base cannot be determined by the commission until its engineers shall have made a detailed study and appraisal of the company's properties. This inventory and appraisal has been ordered and will require a year or more to complete.

Scattered Happenings in the Electrical Sphere

UNITED STATES

San Francisco Rate Agitation

President A. F. Hockenbeamer of the Pacific Gas & Electric Company points out that the city of San Francisco, whose officials are asking the California Railroad Commission to cut the company's rates to the city, is paying $64,100 a year less for energy than in 1928 as a result of rate reductions. He ascribes the agitation to politics. In the meantime the California State Grange has come forward to ask the commission to reduce the rural rates of the Pacific Gas & Electric and Great Western companies as "excessive and not warranted by present economic conditions."

Converting 60 Cycles at Louisville

Rotary converters and other equipment are gradually being installed in substations by the Louisville Gas & Electric Company to enable the company to convert 60-cycle current from either its hydro or steam plants for use in handling the 25-cycle load of the Louisville Railway Company. Last June the Louisville Gas & Electric paid $3,000,000 for all power properties of the Louisville Railway Company and made a 20-year contract to furnish

power. A large rebuilt frequency changer, of the vertical-motor generator-set type, has been installed at the old railway company plant, but it may be a year or more before the railway boilers will be shelved for use as standby power.

Teegarden Named Power Board Solicitor

Harold Benson Teegarden, counsel in the office of the anti-trust division of the Department of Justice, has been appointed solicitor of the reorganized Federal Power Commission. He takes over the post left vacant last December when Charles A. Russell, former solicitor, was dropped by the board. He will fill the position made prominent by the now famous clash between the President and the Senate. Mr. Teegarden handled the government's defense against the proposed modification of the packers' consent decree in the Supreme Court of the District of Columbia.

N.E.L.A. to Atlantic City in 1932

According to an announcement made this week by Paul S. Clapp, managing director National Electric Light Association, the 55th convention of N.E.L.A. will be held in Atlantic City, N. J., June 6 to 10, 1932. An exhibit of equipment and appliances will be a part of the program. The Atlantic City Auditorium and Convention Hall will be used.

Woodruff Joins Pennsylvania Commission

One of the two vacancies on the Public Service Commission of Pennsylvania has been filled by the acceptance by George W. Woodruff, Attorney-General during the first Pinchot administration and special utilities counsel for the Governor since January, of a place on the commission. Woodruff will succeed Charles H. Young of New Castle, whose term expired July 1. Woodruff's commission will be dated July 16. "No one else in Pennsylvania is so familiar with public utility questions from the public point of view," said Governor Pinchot in announcing the appointment.

Kansas City (Kan.) Plant Restores Rates

Conservation of income to provide funds for continuing the development of the municipal plant at Kansas City, Kan., on a cash basis will prevent repetition in 1932 of a 50 per cent cut made in 1931 in charges for light and power for municipal use. The cut for 1931 totaled about $75,000, that amount being eliminated from the city's budget.

North Carolina Asked to Intervene

Governor Max Gardner of North Carolina has been asked by J. E. S. Thorpe of Bryson City, president of the Nantahala Power & Light Company, subsidiary of the Aluminum Company of America, to intervene on behalf of that state in the suit brought in the federal courts to upset a decision of the Federal Power Commission denying a minor-part power license to the Appalachian Electric Power Company for the construction of a plant on the New River in Virginia. The Governor referred the request to the State Attorney-General.

Michigan Commission Reorganized

Robert H. Dunn has been chosen chairman of the Michigan State Public Utilities Commission. Governor Brucker recently announced the new personnel of this body. Others besides Mr. Dunn are: Harry C. McClure, Kit F. Clardy, Harold J. Waples and Edward T. Fitzgerald.

Electrical Inspectors Plan Joint Meeting

Plans are in process for a joint meeting of the Eastern and Western sections of the International Association of Electrical Inspectors to be held in Pittsburgh in September. It will be the first time for the sections to meet at the same time and place.

Oklahoma Has Several New Utility Laws

Effective July 10, several laws involving the utility companies of Oklahoma went into effect. These include one which prohibits public service corporations from engaging in incidental lines of business, including utility merchandising, except such equipment as may be necessary to maintain continuity of service to patrons (See ELECTRICAL WORLD, page 1046, Jan. 6, 1931), and another requiring registration of stocks, bonds and other securities and requiring the registration of persons selling such securities. The securities of public utility companies, the sale of which has not been authorized in other states, must now be passed upon by the corporation commission and a new securities commission. This latter bill also applies to many other classes of securities and stocks.

Illumination Conference in Montana

To help develop more effective use of light, an illumination conference was held recently at Montana State College, Bozeman, Mont., under direction of the electrical engineering department, headed by Prof. J. A. Thaler, in co-operation with the General Electric, Westinghouse Lamp, Curtis Lighting and Montana Power companies. Sixty professionally interested delegates from nineteen cities and towns in Montana and 90 visitors attended. Lectures and demonstrations by Profs. A. J. M. Johnson and C. F. Bowman and by manufacturing-company specialists and artists were presented in the two-day session.

Coming Meetings

Camp Co-operation XI — Association Island, Henderson Harbor, N. Y., July 27-31. Society for Electrical Development, 420 Lexington Ave., New York.

American Institute of Electrical Engineers—Pacific Coast Division, Lake Tahoe, Calif., Aug. 25-28. F. L. Hutchinson, 33 W. 39th St., New York.

Rocky Mountain Division, N.E.L.A. —Stanley Hotel, Estes Park, Colo., Sept. 2-4. G. E. Lewis, 367 Gas & Electric Bldg., Denver.

Electrochemical Society — Hotel Utah, Salt Lake City, Sept. 2-5. C. G. Fink, Columbia University, New York.

Pennsylvania Electric Association — Bedford Springs Hotel, Bedford Springs, Pa., Sept. 9-11. H. A. Buch, Telegraph Bldg., Harrisburg, Pa.

Empire State Gas and Electric Association—The Sagamore, Bolton Landing, Lake George, N. Y., Sept. 10-11. C. H. B. Chapin, Grand Central Terminal, New York.

American Welding Society — Copley-Plaza Hotel, Boston, Sept. 21-25. M. M. Kelly, 33 W. 39th St., New York.

New England Division, N.E.L.A.— Poland Springs House, South Poland, Me., Sept. 28-30. Miss O. A. Bursiel, 20 Providence St., Boston.

Great Lakes Division, N.E.L.A.— French Lick Springs Hotel, French Lick, Ind., Oct. 1-3. T. C. Polk, 20 N. Wacker Drive, Chicago.

Illuminating Engineering Society—William Penn Hotel, Pittsburgh, Oct. 13-16. E. H. Hobbie, 29 W. 39th St., New York.

CANADA

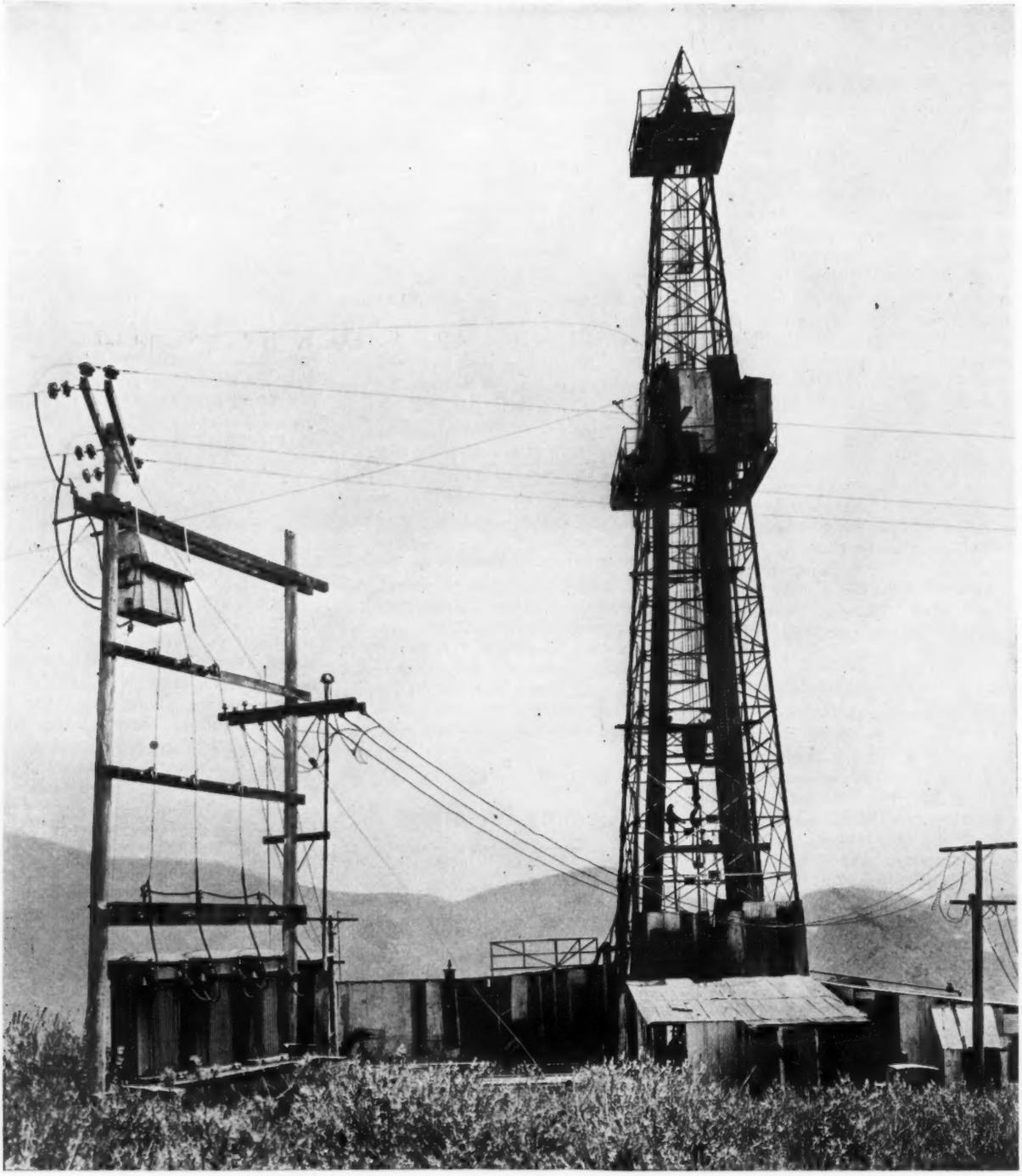
Winnipeg Faces Hydro Shortage

Low-water conditions on the Winnipeg River threaten another power shortage in Winnipeg. It has been stated that only 60 per cent of the normal water flow is available at the various power plants along the river, while conditions show no sign of improvement. Last year there was a subnormal flow on the river, resulting in a power shortage in October and November. Continued dry weather throughout the present year has accentuated the situation. A high official of the Winnipeg Electric Company is reported to have stated recently that the situation this fall and winter would probably be more serious than the shortage of last year.

ABROAD

Shannon Finances Cause Resignations

Affairs have reached a crisis for Ireland's famous power scheme. Patrick McGilligan, Irish Free State Minister of Industry and Commerce, charged the Shannon Electrical Supply Board with spending $3,000,000 or so without authority. As a result J. J. Murphy, board chairman, and Dr. Thomas McLaughlin, managing director and originator of the scheme, are out. The Dail voted McLaughlin a year's salary when he resigned. The latest development is the assurance of McGilligan that prospects for the scheme are brighter than they were twelve months ago. Eamon de Valera's party has agreed to support the required additional appropriation of $10,000,000, and not to make political capital of the board's misfortunes.



Deep oil well electrically drilled

Bottomed at 10,030 ft., the Hobson A-2 well of the Chanslor-Canfield Midway Oil Company, near Ventura, Calif., has set a drilling record. Virtually all of the deep wells in the past have been electrically drilled and it was the flexibility of electric drive that largely made possible sinking this hole nearly 2 miles into the earth. The company making this record pioneered in electric drilling and oil field applications and was one of the first to use electricity 100 per cent in its oil field operations.

EDITORIALS

L.W.W.MORROW
Editor

Two aspects of public attitude need different treatment

IN ATTEMPTS to bring about a more friendly relationship between the public and public utilities it is essential to recognize that the public viewpoint is dual in its nature. In one aspect it is concerned with the local company and in another aspect it is concerned with holding companies as a group. This is evident from the fact that some customers who admit no grievances against their local company object to what they term the "power trust."

Apparently these customers are well satisfied with what they have an opportunity to feel, hear and see, but are fearful of some distant organization whose personnel, reasons for existence and relationship to their local company are not familiar to them. As a result it becomes necessary to handle the two types of public relations in quite different ways.

Factors that influence local utility relations seem to be well understood. This is evidenced by their decided improvement in the last fifteen years, except in cases where executives, department heads or employees have been so self-satisfied as never to view their actions from the outside and correct the causes of irritation. Local good will is an excellent foundation on which to develop confidence in affiliated financing and management organizations, but merely continuing to develop this local good will will not entirely remove fears regarding holding companies.

Bearing in mind the influence which utility employees have on their neighbors and the customers with whom they come in contact, the first move should surely be for local utilities to answer to the satisfaction of their own employees any question the latter may have to ask regarding the justification, economics, relationship or power of the affiliated financing or management company. To be sure that such doubts are satisfied, it might be advisable to establish "blind question" boxes in which any employee could file questions and then to hold departmental meetings at which these questions would be read and answered. Political criticisms should not be ignored in this process. If any employee's questions cannot be answered to his satisfaction, it may indicate that the holding company practice questioned should be modified to avoid continued suspicion or irritation. The questions and answers may serve as excellent material for advertising, "bill stuffers" and similar publicity.

Satisfying the employees and customers regarding the holding company most directly touching them would be a long step in bringing about better understanding of holding-company practices. National opinion is and always will be the composite of local opinion. Therefore the start must be made within the ranks of the operating company and among the people it serves.

Committee operation of merged companies

ALTHOUGH committee functioning is likely to be slower than that of a line-and-staff organization, the committee idea of operating newly merged companies has much to commend itself, at least in the early stages of merger operation. Unless the capabilities of the personnel of merged companies are well known to the management, department heads will in all probability be selected from the men best known to the management and other men more adapted to heading up different functions may be subordinated. By combining the functional heads of the combined companies into committees and rotating chairman-

ship among the membership an opportunity is afforded to study the capabilities of different men and make a more judicious selection of department heads. Furthermore, such committee activities give every member a better appreciation of the capabilities of their associates, and the men finally selected as department heads are aided in delegating duties.

Whether a company sees fit to start merged operation with committees or not, committee functioning is very helpful in determining the duties to which each man is particularly adapted.

New switchgear standards a big step forward

NEW switchgear standards of the National Electrical Manufacturers' Association extend in logical manner the considerable progress made when a simplified schedule of preferred system voltages was adopted a year ago. These logical additions include establishment of test values and performance factors of safety against these test voltages for various types of switching equipment, as well as for insulator assemblies. In the development of these new provisions it proved that prevailing A.I.E.E. standards for insulators and insulation offered obstacles to an inherently logical set-up.

First it was necessary to reconcile the "withstanding" propensity with the "flashover" stipulation; this was done by setting a 10 per cent margin for flashover above ability to withstand. Second, altitude effects are recognized in the agreement that all equipment should be designed for elevations up to 3,300 feet. Here again the factor is 10 per cent, so that altitude and "withstanding" tolerances combine to give a flashover correction of 1.22 to cover the production of equipment which will withstand prescribed voltages at normal altitudes and barometric pressures.

Again, the A.I.E.E. requirement calls for a withstanding test dry of $2\frac{1}{4}$ times rated voltage plus 2,000 volts. This is quite inadequate for the lower voltage ratings because the relative importance of surges (from switching or lightning) is more pronounced at the lower voltage. Also, the ratio of wet to dry test is not met by the insulators in the lower range of voltages. The straight line relationship on which the new standards are based is appreciably higher in its requirements than the A.I.E.E. standards demand. The change amounts to making the intercept for zero voltage rating at 35,000 volts instead of 2,000 and then coinciding with the A.I.E.E. line at the 345-kv. rating values.

The new standards are therefore a distinct advance in that they incorporate the undeniable economic advantage of simplified schedules and likewise eliminate some of the inconsistencies of specifications which have not adequately taken cognizance of the correction factors which experience and research have established. They should therefore be helpful in aiding the user to base his designs and his expenditures more intelligently in the light of using space and insulation materials to get the best performance and economic results.

Organizing for water-heating sales

AT THE present stage of development domestic water heating is more than a "straight merchandising" affair. A degree of engineering insight is necessary to specify equipment ratings for either unlimited or off-peak service. The variations in per capita use of hot water in families through any specified period are surprising, and the accumulation of data from numerous installations is an important element in putting this class of service at the disposal of the general public. Heaters are also undergoing development, and the competition between manufacturers now evident for a large share in this promising business is very keen. The range of energy consumption by installations of specified ratings is none too sharply defined as yet, and the next few months should add considerably to the industry's knowledge of power requirements and demands.

Thorough training of water-heating sales forces is vitally important to success. A single installation which "goes cold" on the customer sends a chill all over the neighborhood and also costs money to remedy if too small an installation has been provided through the eagerness of the salesman to take a contract. The preparation of a clearly worded and complete water-heating sales manual has been found very useful by power companies entering this field, and while the preliminary direction of water-heating activities may be a strenuous affair on account of the many elements involved in the problems of sales

and engineering involved, it should not take many weeks to decentralize the work sufficiently to relieve the headquarters staff of pioneering cares.

Above all things, the customer must be provided with a satisfactory service, and as the equipment to achieve this now seems to be available on a scale capable of indefinite expansion, co-operation between all company departments concerned will work wonders. Indeed, it is likely that water heaters will be widely accepted as staple devices for household service before long, and then it will be practicable to sell and install them on virtually a "hand-me-down' basis. In the interim all forces should work together to standardize practice to meet the varied conditions of service which are so challenging a problem.

Avoiding strains when absorbing unexpected loads

HOW shall sudden, unexpected loads be absorbed by power stations without straining boilers, and particularly turbines? Most companies have partly answered this question by operating certain pieces of equipment at sufficiently less than maximum capacity so additional load can be carried by overload capacity. When lightning or sleet storms threaten, additional equipment may be started up in readiness for emergency loading. Interconnections with other systems also serve as emergency channels of power.

But even these provisions are not always sufficient and some reserve equipment has to be thrown into the breach quickly. Circulation of water from loaded boilers through standby boilers partly relieves the tubes and water walls of the extreme stresses of starting up cold, where banking of stokers or operation of one burner at minimum rating is not desirable.

If turbines have not been shut down too long they will retain a high temperature for some time, but the temperature will not be uniformly distributed and serious warping of the shaft or diaphragms may result. In some recently built plants the attachment of a motor to the turbine shaft to keep it turning over even after shutdown tends to maintain uniform temperature and prevent warping. This idea, coupled with some method of maintaining the temperature, such as bleeding steam into the turbine, should keep a unit in readiness for sudden loading indefinitely.

These practices cannot be the last word, however, and ingenuity should be given full play to devise other methods of caring for unexpected loads without delays or overstraining equipment.

Lest we regret

SINCE the widespread merger and consolidation of operating companies has taken place there has been a tendency here and there to withdraw men from association committee work—national and regional.

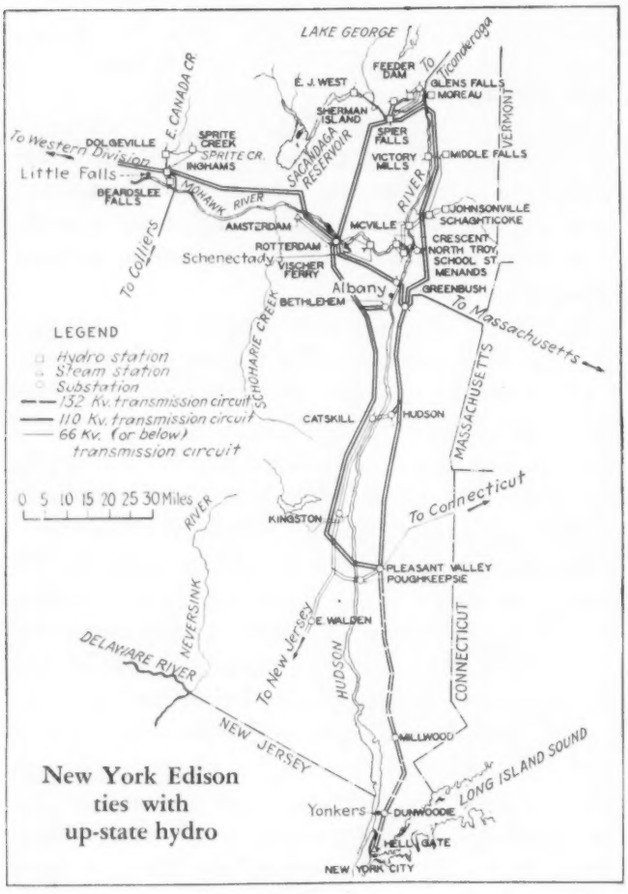
It is true that state or regional association meetings lose some of their former value in sections where the majority of operating companies are under a single management. And it is natural that a parent company having a number of operating companies should feel that it encompasses enough talent to solve all its problems unaided.

But there are dangers of retrogression in this spotted tendency to isolate engineers and operators from association activities. If any one activity can be pointed to more than another which has contributed to the phenomenal engineering progress of the electric light and power business it has been the periodic meeting of men with diverse viewpoints to exchange ideas and practices. The divergent opinions of the men from various companies and different parts of the country have been provocative of discussion that leads to progressive thinking.

The holding of company conventions is an excellent means of co-ordinating practices within a single management, but serious thought should be given as to how to retain the stimulus of the old round-table discussions which characterized former state, regional and national association meetings composed of different companies. The privacy of company meetings tends to exclude the practices and viewpoints of other companies and limits the dissemination of practices that may be adapted to conditions outside the sphere of their origination.

The exact mechanism which will knit such company meetings together and provide the same benefits that arose from former methods of exchanging ideas is not now evident, but it is certain that its basis must be free exchange of opinion and practice that will draw forth discussion.

Lightning-Proof Performance



New York Edison ties with up-state hydro

Lines built to meet the direct stroke.

Insulation not to be graded.

Ground wires spread and elevated.

Short counterpoises.

Flexible towers for ruling design.

Condensers to be half-housed half-outdoors.

CONSTRUCTION has begun on a tie line between the New York Power & Light Company division of the Niagara Hudson system and the New York Edison system. In some respects the construction will differ from that of similarly important lines built in the last few years.

The general plan of interconnection is by means of four 110-kv. circuits meeting near Poughkeepsie (Pleasant Valley) and two 132-kv. circuits from this junction point to the end of the existing Hell Gate-Dunwoodie cables.

The ruling design of the 110-kv. circuits uses flexible towers on a normal spacing of 800 ft. with a dead-end anchorage at every mile. As far as is known, the spacing of conductors which is sufficient for 132-kv. operation has never been attempted in flexible towers. Ground wires, shield rings and insulation levels for both voltages will be predicated on the assumption that flashovers will occur from direct strokes, if at all. Insulation levels will be uniform (no grading at terminals) and aimed to keep interruptions from flashovers to an average of between one-half and three-quarters per 100 miles of circuit per year. Condensers will be half-housed, a compromise between complete outdoor installation and full sheltering.

The configuration of the 132-kv. circuit is unusual in that the middle conductor will be set closer to the tower than those at the top and bottom level.

The economic justification for the line rests in three principal factors:

1. The short, sharp peak of the metropolitan load of the New York Edison system.
2. The spring and fall surplus of hydro power in the New York Power & Light Company system.
3. The availability of surplus steam capacity in the Edison system at times of low rates of stream flow on the upper Hudson system.

Surplus steam and water co-ordinated

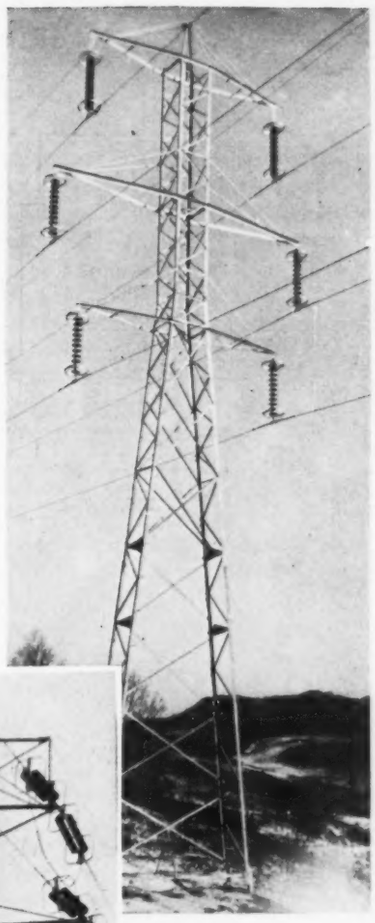
In the first instance the New York City maximum peak has a duration of from 90 to 120 hours per year and requires a firm capacity and reserve, with a high measure of reliability, to meet it. Hudson River hydro supplied over a high-grade line can perform that function and conserve steam investment. The diversity of load also gives opportunity to use fluctuating hydro capacity to best advantage. In the second instance the New York load is at all times large enough to absorb advantageously all the floodwater energy, and in the third instance the New York City load is lowest at times when water up-state is also low; idle steam capacity in the city can therefore be employed to displace some of the up-state steam production.

On these considerations it was decided to provide two circuits capable of handling 150,000 kw. in either direction. Under emergencies and for short peaks it is expected that the lines can carry 200,000 kw. with all parts of the connection in service. The losses will, however, be too high at 200,000 kw. to warrant long-hour use at this load. The New York Power & Light Company will own the lines as far as the Putnam-Westchester county line and the Edison system will be the owner south of that point. The 132-kv. construction will be similar in design in both territories except as it must be modified to meet changing topography, suburban estates and frequent villages at the New York City end.

Aim of Niagara-Edison Tie

By J. D. WHITTEMORE

Executive Engineer New York Power & Light Corporation, Albany, N. Y.



Six flexible towers on 110 kv. to the mile

Will stand without tower failure even with two broken conductors.

In brief, the tie will consist of four 110-kv. circuits, two on the west side of the Hudson to Poughkeepsie, two on the east side south to Poughkeepsie and two 132-kv. circuits on the east side of the Hudson from Poughkeepsie to join with the 132-kv. cables running north from the Edison system to the Dunwoodie substation near Yonkers. The two west side circuits will originate at Rotterdam substation and will be tapped at South Bethlehem. The two east side circuits will originate at the Spier Falls hydro station and will be bused at Greenbush (near Albany) and tapped at Hudson and at North Troy.

Aim to minimize flashover outages

The 110-kv. circuits will have 605,000-circ.mil aluminum conductors, sagged for a tension of 9,000 lb. under maximum loading of 8-lb. wind and ½ in. of ice. The construction will give a minimum clearance of 4½ ft. from ground points. The conductors will have tapered armor rods to prevent vibration troubles. Eleven insulator disks will be used in suspension and twelve at strain points. This is three more disks than has been used on 110-kv. construction in the East. A survey of nation-wide experience indicates that this should keep flashovers to a value between one-half and three-fourths per 100 miles of line per year. Shield rings will be employed on all insulators. A newly designed slip clamp will function at tensions of not less than 3,500 nor more than 5,000 lb. resulting from broken conductors. The efficacy of these slip clamps depends primarily on the refinement of manufacture to produce them with accuracy of dimensions and contour.

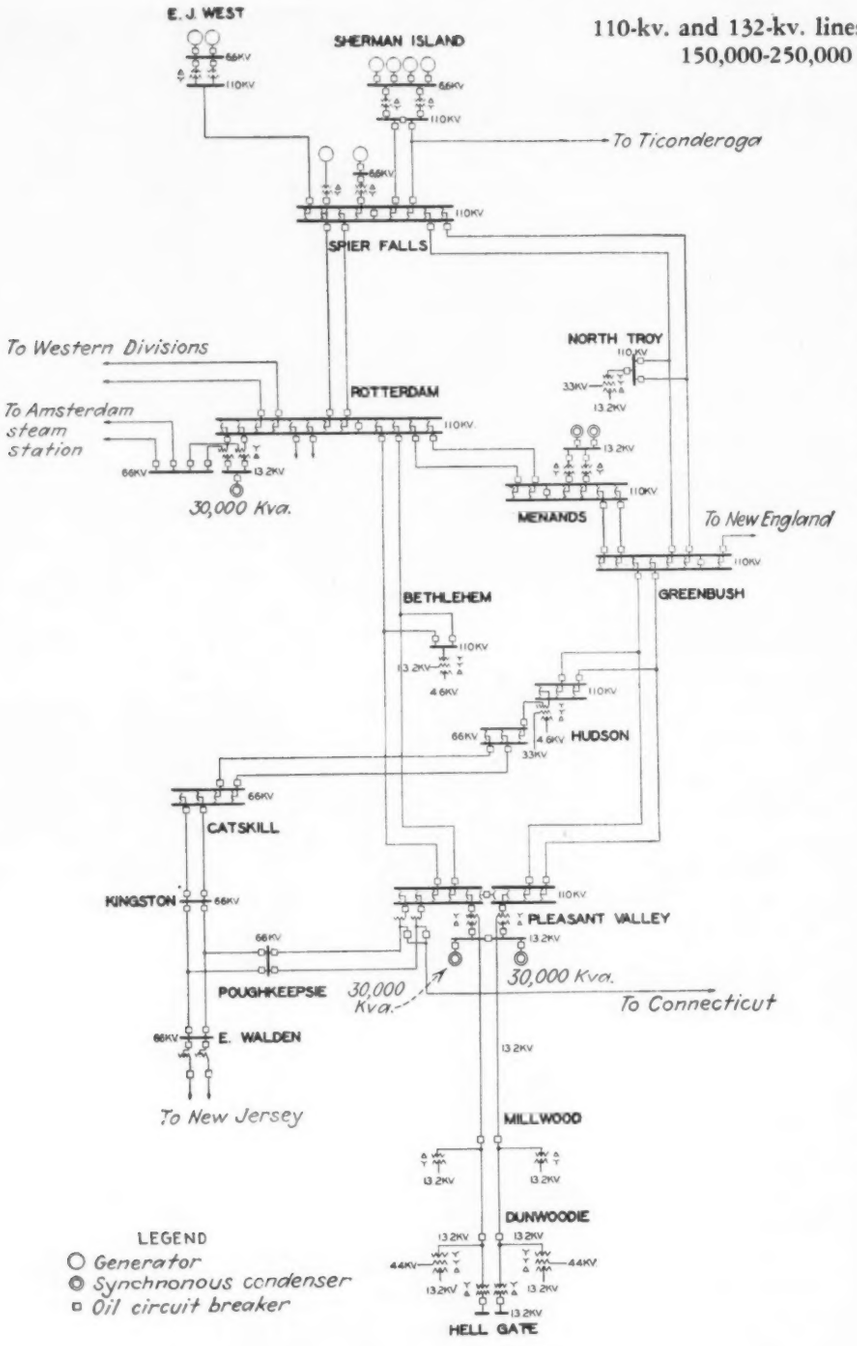
New type of flexible tower design

The flexible tower construction is of a new type and is unusual also in the employment for spacings as large as are involved in the design. In spite of the inherent flexibility the design will stand without tower failure even in case of two broken conductors. The angle tower will withstand three broken conductors on angles up to 30 deg.; above 30 deg. and on dead-ends the design is adequate for all conductors broken.

The lines north of Pleasant Valley (near Poughkeepsie) will have two ground wires directly over the ends of the top arm. Provision is made for the attachment of a third ground wire in the middle about 6 ft. higher than the two others.

The four circuits will be bused at Pleasant Valley. High-speed oil-blast explosion chamber breakers functioning in eight cycles are to be used. The rupturing capacity at high power concentration points will be 2,500,000 kva. and at other points 1,500,000 kva. Differential protection will be used for generators, synchronous condensers and transformers, and a special ground differential scheme will be used for each section of bus at Pleasant Valley. To switch out line faults, the relay scheme will use balanced current and balanced ground relays, with reactance type relays to handle double-circuit faults. The circuits and the taps from them are so arranged that there is not more than one tap between any two bus points. Tap breakers will

Strain tower for 110-kv. line



110-kv. and 132-kv. lines to transfer 150,000-250,000 kw.

be pilot-wired back to the bus points in order to avoid cascading of switch operations. Everything possible is being done to obtain the fastest possible elimination of line faults.

The calculated stability limit is 250,000 kva. for steady state. The lines are confidently expected to carry 150,000 kva. of load through any disturbance that leaves one through circuit in operation. There will be two 30,000-kva. condensers at Pleasant Valley, a 30,000-kva. condenser at Rotterdam and two 15,000-kva. condensers at Menands substation, on the cross-connection between Rotterdam and Greenbush substations. Extra-high-speed excitation will not be employed on these condensers because it is felt that exceedingly fast switching destroys the effectiveness of high-speed excitation; that is, the faults will be eliminated before the accelerated excitation scheme can come into full play.

At Pleasant Valley there will be two transformer banks, each of three single-phase transformers, each bank having a self-cooled rating of 100,000 kva. and an airblast rating of 133,000 kva. All transformers are equipped with devices for tap changing under load to provide 12 per cent voltage range up and down in eight steps of 3 per cent. Further, each bank has a 30,000-kva. tertiary to receive 30,000 kva. of condenser correction. The banks are connected to the 110-kv. bus, with oil circuit breakers equipped only with differential relay protection. The condensers are not bused. The 132-kv. lines are not bused at any point between Pleasant Valley and the Millwood substation. There are taps to the circuits in Westchester County, at Millwood, Elmsford and Dunwoodie.

The condenser installations partake of both outdoor and housed features. Two condensers will be placed in axial alignment with their exciter ends facing one another. These exciter ends will be housed with enough space between them to provide space for overhauling either rotor. Cradles are to be provided for removing the rotors without opening the stator casing beyond the wall of the condenser house. Only in case of such severe damage as to necessitate return of a rotor to the manufacturer will it be necessary to remove the exposed end bell.

The two 132-kv. circuits south from Pleasant Valley will be built on square towers using 795,000-circ. mil aluminum conductor strung to a maximum tension of 12,500 lb. The line will be spanned and sagged for a maximum loading of 8 lb. of wind and ½ in. of ice as far south as the Putnam County line, but through the mountainous section of Putnam County the spanning and sagging will be planned for 1 in. of ice and 8 lb. of wind. These circuits will be insulated with twelve disks in suspension and thirteen at strain points. Arcing horns will probably be used throughout, although the tower design will permit the use of shield rings wherever they seem desirable.

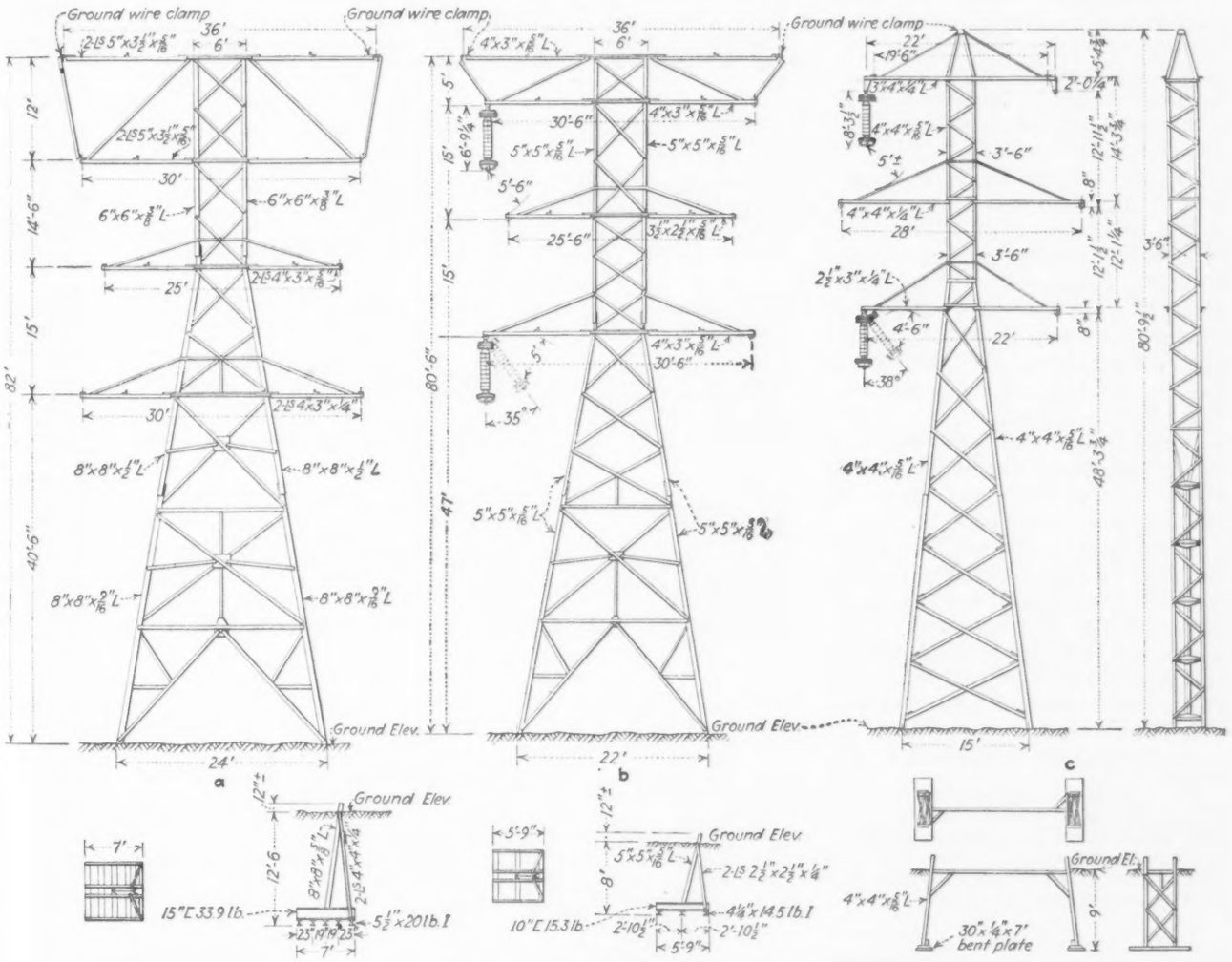
When the planning of these circuits was initiated the thinking about lightning was more or less evenly divided between direct and induced strokes. Lately, however, opinion has shifted very strongly toward the direct stroke theory and this has resulted in a different treatment of ground wire protection on the 132-kv. lines designed subsequently to the 110-kv. lines. In the 132-kv. section

the ground wires will be elevated to a position about 10 ft. above the top conductors and at the same time spread laterally. Instead of providing a third ground wire, however, counterpoise conductors will be buried just below plow depth wherever the ground resistance is over 5 ohms. The conductor will be ½-in. copper clad of 30 per cent conductivity and will extend only 250 ft. from the tower, as it is not believed that additional length would be any more effective in giving protection against lightning difficulties.

Line insulation will not be graded in order to keep high voltage away from terminal apparatus. Instead, thyrite arresters will be installed at all line terminals and an auxiliary gap will be provided at the last point of support of the line. The auxiliary gap is nothing more than a decreased separation of the grading shields. Transformer neutrals are to be solidly grounded in conformity with the practice elsewhere on the system. Apparatus insulation will permit the use of resistance in generator neutrals and reactance in transformer neutrals if operating experience later indicates that this is necessary. It is not expected that this change will necessitate any change in relaying arrangements.

Field Welding Improved by Special Erection Seat

Development of a special erection seat, shop-welded to columns and beams, eliminated the necessity for using any field bolts during the erection of the arc-welded frame of the eighteen-story steel-and-concrete Allied Arts Building in Lynchburg, Va., and effected a considerable saving in the final cost of the structure, according to *Engineering News-Record*. The majority of past welded building designs have required the punching of holes in both columns and beams to take care of bolted connections used for erection purposes and to hold together joints that are to be welded. The use of the welded erection seat made punching unnecessary, eliminating the labor and cost of moving heavy sections to and from the punching machines, and in fact made it unnecessary to pass the steel through a fabricating shop except for cutting to length and milling the columns. The laying out and shop welding was done alongside a shipping track in a welding shop equipped with a crane.



(a) Strain tower on 132-kv. line. Ground wires spread and elevated. Middle conductor set in to benefit by cone of protection of ground wires. (b) 132-kv. suspension tower. (c) New flexible design for 110-kv. suspension

Aluminum Busbars Resist Power Arcs

By J. D. PORTER
Aluminum Company of America, Pittsburgh, Pa.

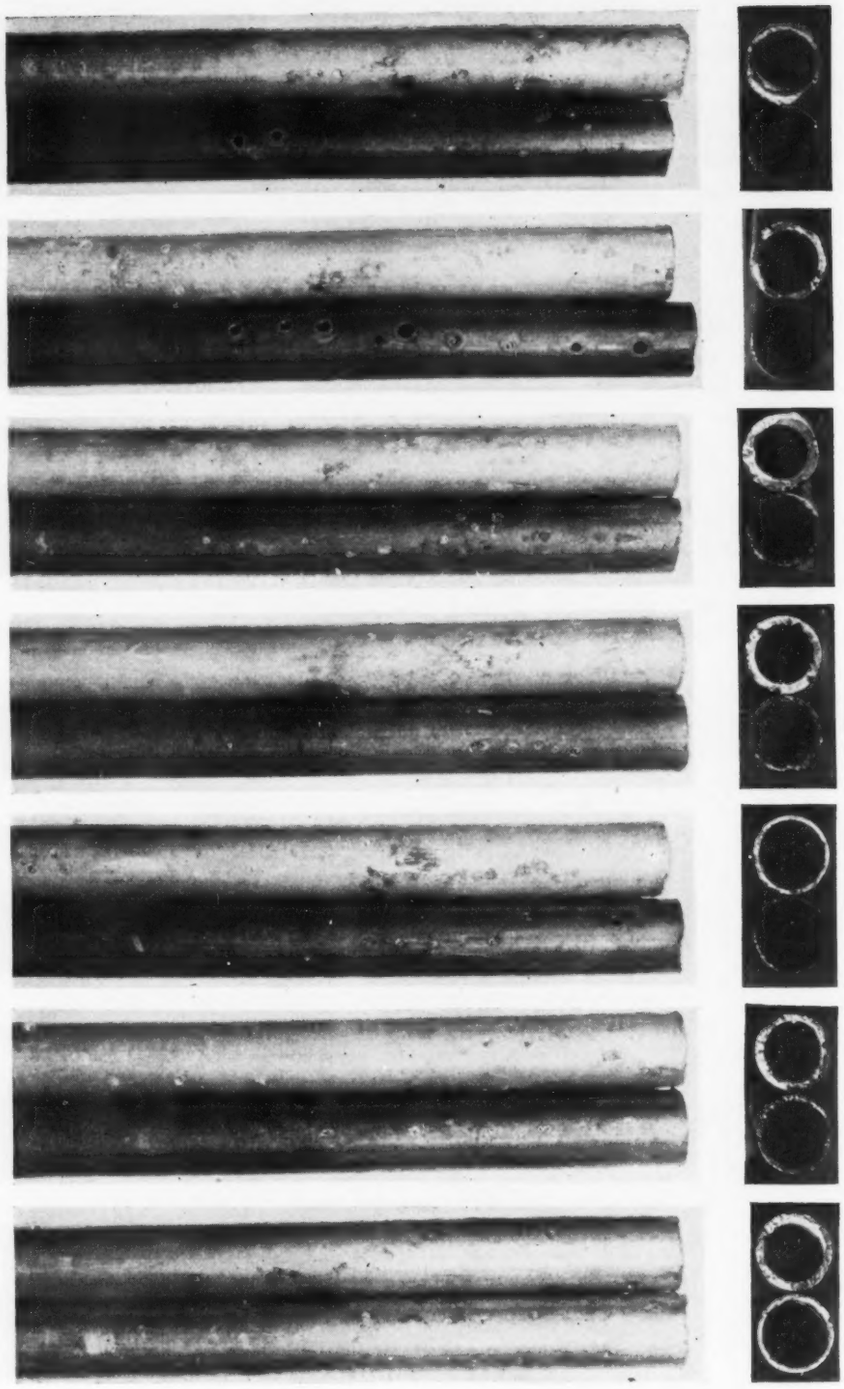
In order to determine the effect of power arcs of long duration on tubular aluminum busbar, tests were recently made under various currents and with several different weights and thicknesses of tubing.* A copper and an aluminum tube having the same outside diameter but different wall thicknesses were spaced one above the other with their axes at right angles. Power arcs were created between the two tubes and allowed to hold until blowout occurred from the magnetic forces set up. It was the original intention to use current values five to six times as great as those shown in the accompanying figure, but preliminary tests indicated that arcing currents of such magnitude could be held for only 12 or 15 cycles, whereas longer duration was desired.

The diameter of the tubing tested was 3.5 in. Two wall thicknesses of copper tube were used. Aluminum tubes of two different wall thicknesses were tested with each wall thickness of copper. In four of the tests the aluminum tube in each case is the electrical conductance equivalent of the copper tube matched with it. Tests 1, 4, 5 and 6 meet this condition. In tests 2 and 3 the electrical conductance of the aluminum tubes is greater than of the copper tubes. In test 7 both tubes are of aluminum.

Test 7 was carried out to observe if possible any variation in the amount of burning on two aluminum tubes having different wall thicknesses and subjected to the same arc. It is apparent that for walls of reasonable thickness there is no appreciable difference.

In all cases the final break of the

**Tests made by engineers of Westinghouse Electric & Manufacturing Company's high-power laboratory on behalf of Aluminum Company of America at the suggestion of several interested public utility companies' engineers.*



Aluminum and copper busbars tested under power arcs
In the accompanying figures the aluminum bars are on top.

Test No.	Wall Thickness Inches	Weight, Lb.-Ft.	Spacing, Inches	Current Average R.M.S.	Current Maximum R.M.S.	Duration, Cycles
1	0.125 Copper	5.12	12	1,620	3,140	92
	0.216 Aluminum	2.62		2,450	2,820	115
2	0.125 Copper	5.12	12	2,010	3,140	250 to 300
	0.375 Aluminum	4.32				
3	0.25 Copper	9.9	12	3,360	5,570	64
	0.3 Aluminum	5.53				
4	0.25 Copper	9.9	12	3,580	5,280	73
	0.416 Aluminum	4.73		1,780	2,780	67
5	0.125 Copper	5.12	6	1,900	3,330	114
	0.216 Aluminum	2.62		2,020	3,060	76
6	0.25 Copper	9.9	4	(3,600) approx.*	(5,400)	90
	0.416 Aluminum	4.73		(2,000) approx.*	(3,000)	approx.
				(2,000) approx*.	(3,000)	
7	0.216 Aluminum	2.62	4	(2,000) approx.*	(3,000)	90
	0.375 Aluminum	4.32				approx.

* In tests Nos. 6 and 7 the currents are estimated, since through error no oscillograms were taken

arc was from a loop off the ends of the tubular sections.

The temperature of an electric arc is several times the melting temperature of any busbar metal. Although the melting temperature of copper is 50 per cent higher than that of aluminum, it is apparent that this difference is a negligible factor in the relative effects of an arc as produced by flashover or short circuit. More important is the relative tendency for concentration of the arc at one point on the metal surface. Observations during these tests bear out conclusions reached elsewhere that the aluminum arc is comparatively unstable and does less damage to the aluminum surface because of the arc's lack of concentration. The most obvious conclusion was that aluminum does not enter into combustion, as is sometimes erroneously claimed.

A supplementary test wherein currents varying from ten to 30 times normal ratings were passed through standard bolted lap joints in flat aluminum busbar for periods of from five to eight seconds showed no ill effects on the contact surfaces. These periods of time greatly exceed the expected duration of short circuits in actual service.

▼

Master Curve Facilitates Relay Setting Design

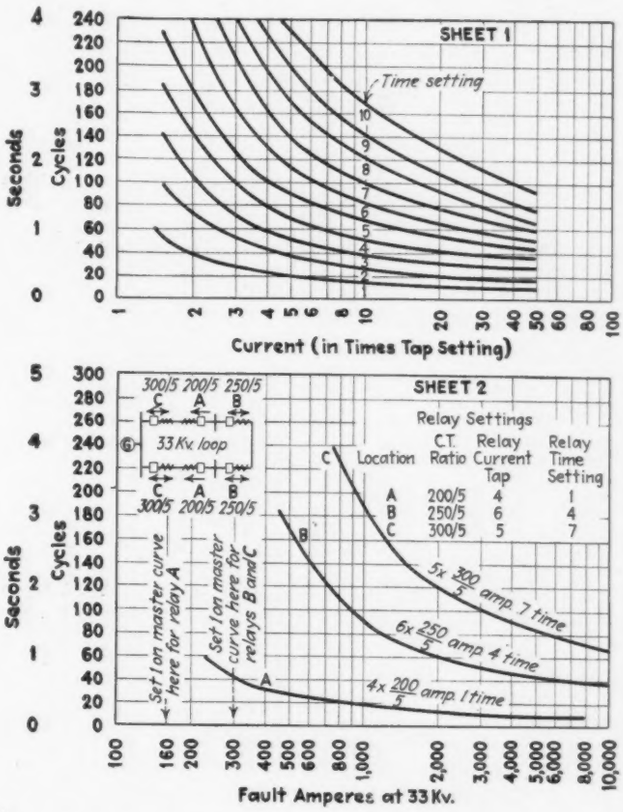
By B. V. VOLGOVSKOY

Columbia Engineering & Management Corporation, Cincinnati, Ohio

Time saved, accuracy improved, error chances reduced and work simplified have been accomplished in the Columbia Engineering & Management Corporation by the elimination of the usual point-by-point plotting through the use of master curves in the preparation of curves of specific relay performances. The usual method is to plot time-current curves for relays and fuses in order to show the time clearances within the range of expected short circuit. A family of curves, one curve for each relay or fuse, must thus be plotted on one sheet to a common current basis. Since different relays may be set on different current taps and may be connected to current transformers of different ratios, and furthermore may be used on systems of different voltages, it is necessary to convert the values read from master relay curves to the basis used for plotting a specific curve. Thus from six to ten points for each curve have to be read off the master curve and the abcissa calculated for each point. This process consumes considerable time. The method described here involves almost no calculations and reduces the plotting to a mere tracing.

Our master relay curves are plotted on two-cycle semi-logarithmic paper with time along the vertical arithmetical axis and the current (in "times tap setting") along the logarithmic horizontal axis. All curve tracing is done on the same kind of paper (semi-transparent "onion skin.") The X-axis of a curve sheet is calibrated in fault amperes on the desired voltage basis. The sheet is laid out on top of the master relay curve and then shifted horizontally so that the abcissa "1" on the master curve is directly under the value equal (relay tap) × (current transformer ratio) on the prepared sheet. The relay curve with the desired time setting is then traced. The same method is followed for all other curves. If the relay in question is used on a circuit of a different voltage from the one used as the basis, the value of "abcissa factor" is calculated as follows:

$$(\text{relay tap}) \times (\text{current transformer ratio}) \times \frac{(\text{voltage of circuit})}{(\text{voltage used as basis})}$$



Specific curves are traced from master shapes

The curves on sheet 2 are reproductions of three of the master curves on sheet 1, determined as in the following example:

Here similarly lettered relays are to have similar settings. Current transformer ratios and relay settings are as given. It is required to draw the curves for relays A, B and C.

For relay A, set 4 amperes, 1 time,

$$(\text{relay tap}) \times (\text{C.T. Ratio}) = \frac{4 \times 200}{5} = 160$$

Set 160 on sheet 2 above "1" on sheet 1 and trace the curve with time setting of 1.

For relay B, set 6 amperes, 4 time,

$$6 \times \frac{250}{5} = 300$$

Set 300 on sheet 2 above "1" on sheet 1 and trace the curve with time setting of 4.

For relay C, set 5, amperes, 7 time.

$$5 \times \frac{300}{5} = 300$$

Set 300 on sheet 2 above "1" on sheet 1 and trace the curve with time setting of 7.

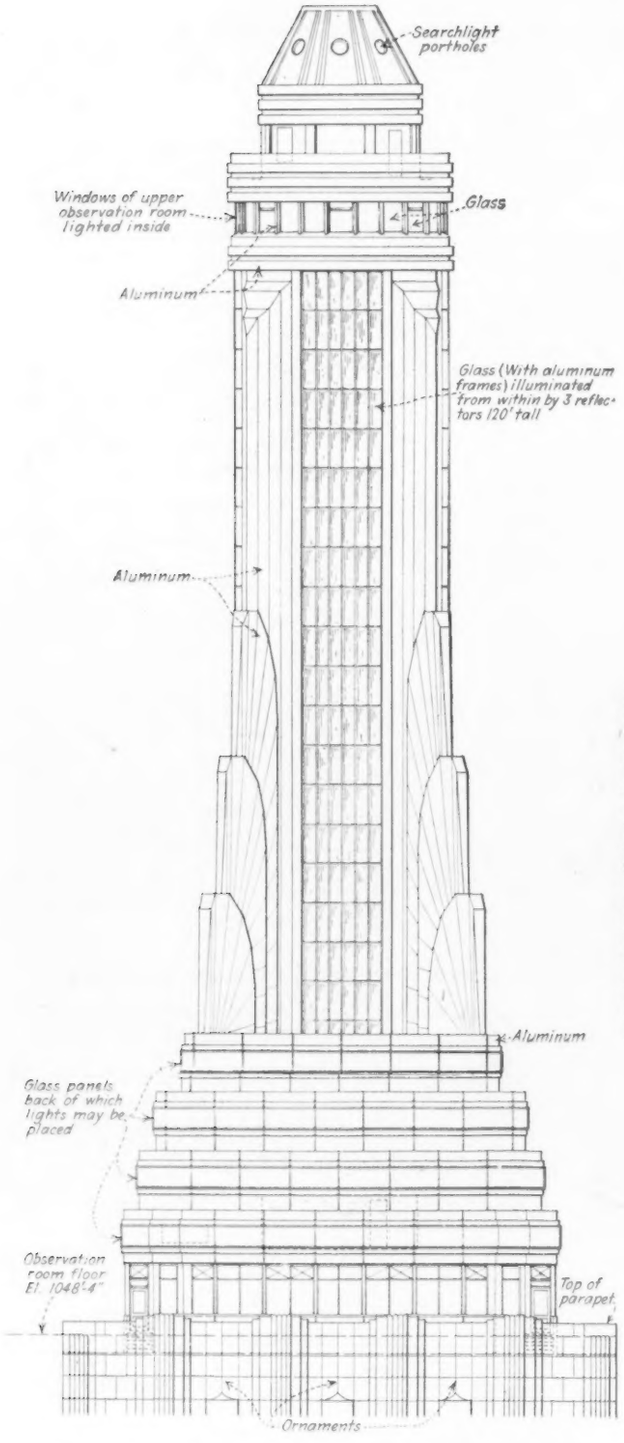
It is necessary to prepare a sheet of master curves for each type of relay or fuse. The principle of the method is the same as that of an ordinary slide-rule.

Lighting the World's Tallest Building

By EUGENE CLUTE

WINDOWS 120 ft. high, four of them, glow with a soft, even light in the shaft of the tower at the top of the new Empire State Building on Fifth Avenue, New York, between 33d and 34th Streets. Care was taken in the lighting to give unity to the entire effect of building and tower illumination. This necessitated special treatment at the base and top of the tower. Innovations were also introduced in lighting some of the principal spaces on the ground floor.

The problem of lighting the long tower windows was worked out on the building experimentally. A full-

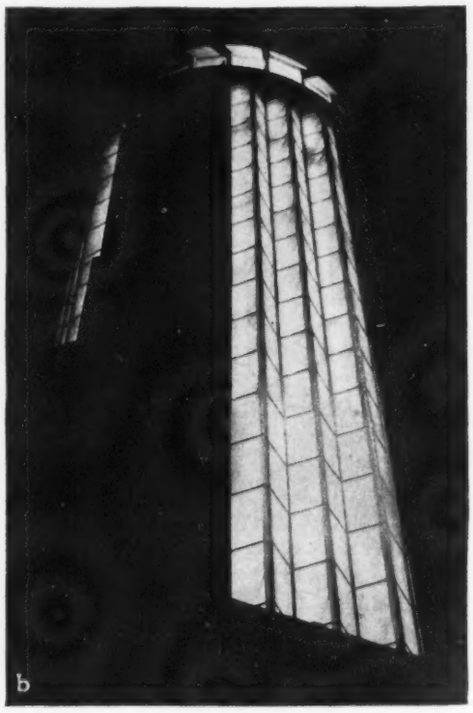


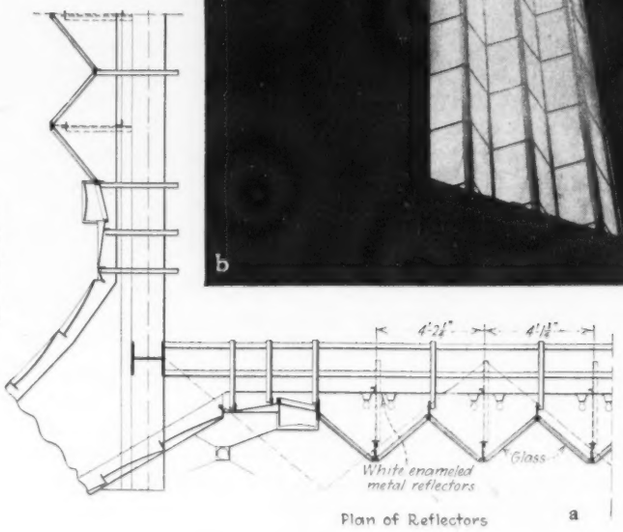
Empire State Building tower made a shaft of light

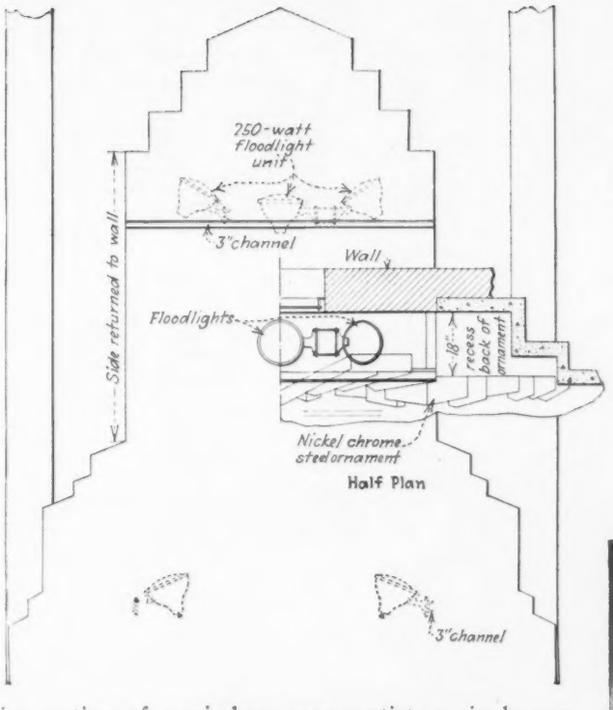
The 120-ft. windows are illuminated by means shown in the illustration at the right. Searchlights throw beams through top portholes. Lighted windows of 86th floor observation room form the base; glass panels in stepped setbacks above may also be equipped with lights; flood-lighting on the walls below (see illustration on opposite page).

Lights behind sawtoothed glass windows

The window mullions and muntins are of aluminum between jambs of nickel-chrome steel. Glass is zigzagged to form a sawtooth; a sandblast finish gives translucent effect. There is a window on each of the four faces, each lighted by 480 lamps in four 120-ft. rows of 120 lamps. Floors provided every 21 ft. give access for relamping.







size section of a window, representing a single one of its several "sawteeth," was built and set up in approximately the position the window would occupy. Lamps of different wattage were tried and the results noted. It was found that with lamps of comparatively high wattage, such as would naturally be supposed necessary, the result was a blur of light that obliterated the outline of the window and made it appear as a shapeless nebula. Lamps of somewhat less wattage cured this trouble, but brought another difficulty, for these lamps showed as bright spots on the glass.

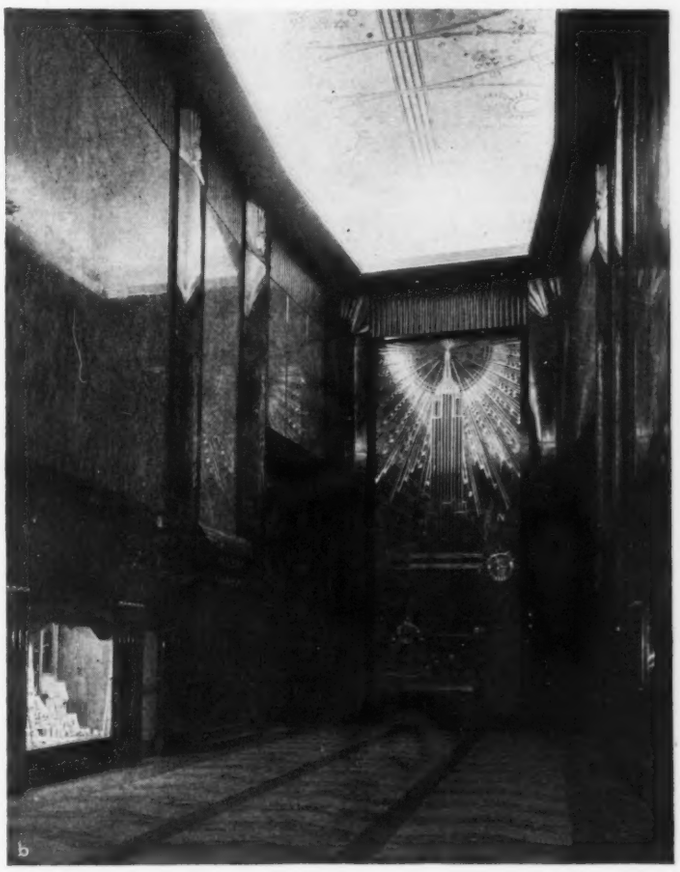
When lamps of still lower wattage were substituted there was no blur of light; also, there were no bright

Tower has illuminated base

Large metal ornaments terminate the long vertical windows on the north and south fronts of the building proper. The tower base is lighted by 250-watt floodlighting units concealed behind these ornaments. Five units back of each ornament, in groups of two at the bottom and three at the top, in an 18-in. space behind the ornament. Mounted on the supports provided for the ornaments.

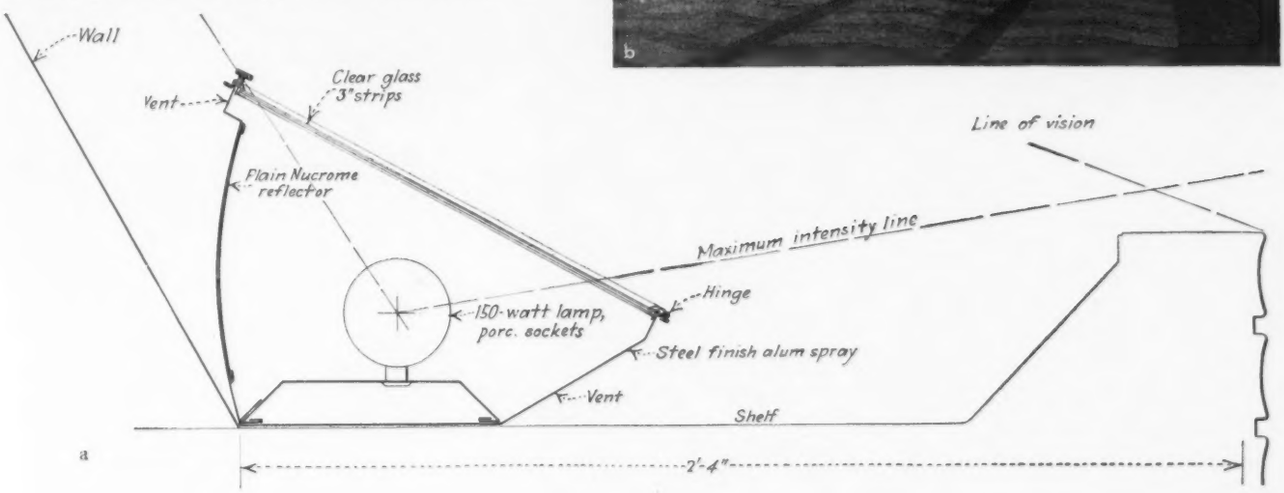
spots, and the illumination was sufficiently strong to be seen at a great distance. Lamps as small as 5 watts proved to be satisfactory and are used in adapters.

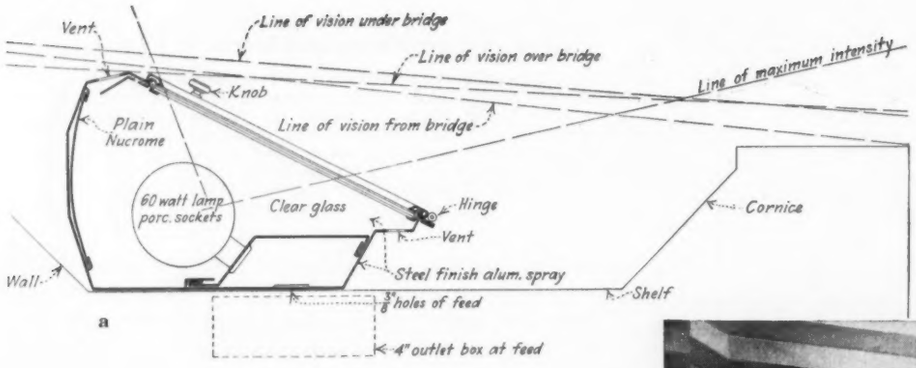
At the very top of the tower is a dome of nickel-chrome steel pierced by eight portholes, which have watertight joints and fastenings of the type used on the portholes of ships, so that they may be opened for the purpose of cleaning the glass. Back of each porthole is a 1,000-watt searchlight of a new and improved type.



Cove lighting for main entrance (three stories high)

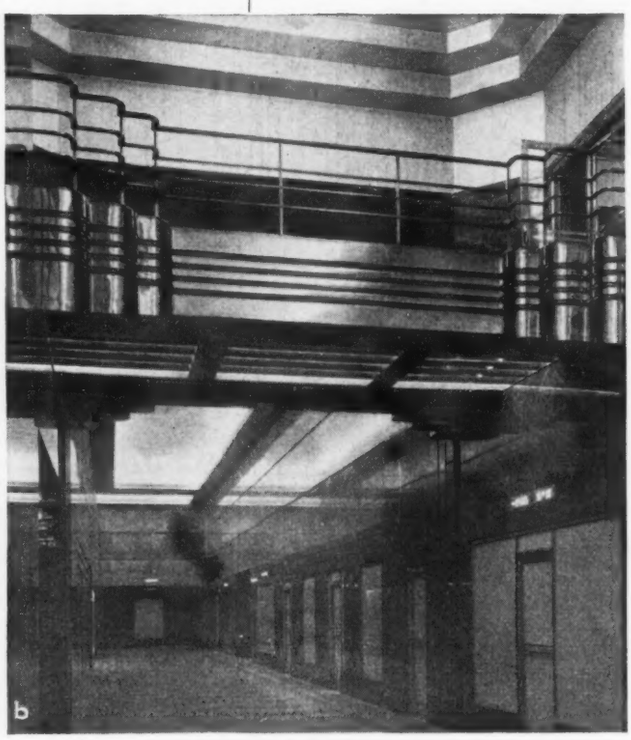
Cornice projects 3 ft. 9 in. from wall and is 2 ft. 8 in. below ceiling. Soffit is of plaster on metal lath. Vertical edge is of aluminum 12 in. deep; simple design of stepped-back planes. Against the wall is a continuous reflector with plain chromium surface; in front of it are 150-watt lamps on 12-in. centers, all inclosed in continuous trough-like housing of sheet steel finished with aluminum spray and provided with a slant cover of glass divided into 3-in. strips to allow for expansion and contraction.





Cove scheme for second-story corridor

Bridge illuminated on underside by lights in trough reflectors as shown in the illustration on page 109.



The beams from these searchlights, directed through the portholes, will radiate upward from the crown of the tower in an impressive beacon.

When the tower is lighted there is a horizontal band of light at its base, formed by the lighted windows of the observation rooms on the 86th floor. Above this the base takes the form of a series of steps, in the faces of which are continuous bands of glass designed to be illuminated from within, if desired. From this point, 44 ft. above the roof of the building proper, the large windows already described form sharply defined vertical rectangles of light. Above these in a horizontal band are the lighted windows of the upper observation room at 101st floor level. Crowning all is the flare of the searchlights.

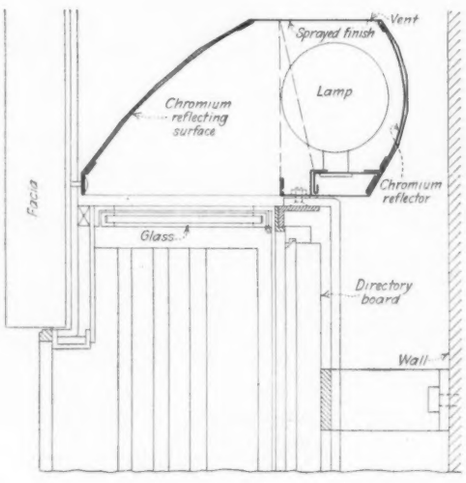
To provide a visible foundation for the tower, the upper part of the walls of the building is moderately lighted by floodlighting units concealed behind the large ornaments (17 ft. high by 13 ft. wide) of nickel-chrome steel that terminate the three long vertical lines of windows in the center of each face of the 86 stories of the building.

Unusual lighting in ground floor lobbies

In the three-story main entrance lobby there is a shelf-like cornice all around the walls which provides for illuminating the ceiling in cove manner. The light is projected from the 150-watt lamps upward and outward upon the ceiling, from which it is reflected downward into the room. In the two-story lobbies the arrangement is similar, but on a somewhat smaller scale. In this latter case 60-watt lamps are used on 1-ft. centers.

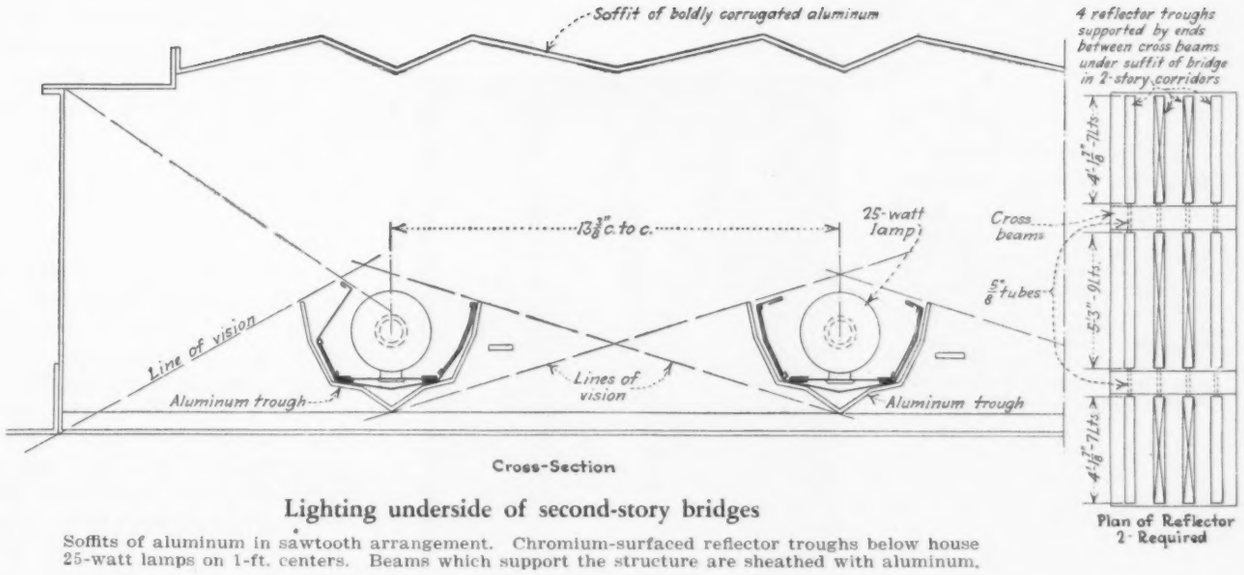
In the elevator lobbies and in the one-story corridors that connect them a different method is used. Here the light sources are partly recessed in the top of the wall and slant outward slightly upon the ceiling. The lamps are in a trough reflector that lies in the bottom of the housing and there are glass panels in the front ornamented with a frosted design in intaglio upon the inner surface. The inside of the back of the unit is painted dead black and the inside of the top is formed of a plain horizontal plate of metal with a chromium surface. A part of the light is reflected upward and outward into the room from the trough reflector in which the lamps are set and part of it strikes the bright metal surface in the top of the housing and is reflected downward and outward into the room. The black back, of course, does not reflect light. Its function is to serve as a background for the ornamental glass which catches considerable light in its sunken ornament and diffuses it into the room.

The glass forms a continuous band except where it is interrupted by louvered panels which ventilate the units. These occur about every 20 ft. where structural steel members reduce the depth too greatly to permit the placing of lamps. The black back of the hous-



Directory board indirectly lighted

Rays from 60-watt lamps on 1-ft. centers reflected outward and downward over directory panels by plain metal reflector with chromium surface.



Lighting underside of second-story bridges

Soffits of aluminum in sawtooth arrangement. Chromium-surfaced reflector troughs below house 25-watt lamps on 1-ft. centers. Beams which support the structure are sheathed with aluminum.

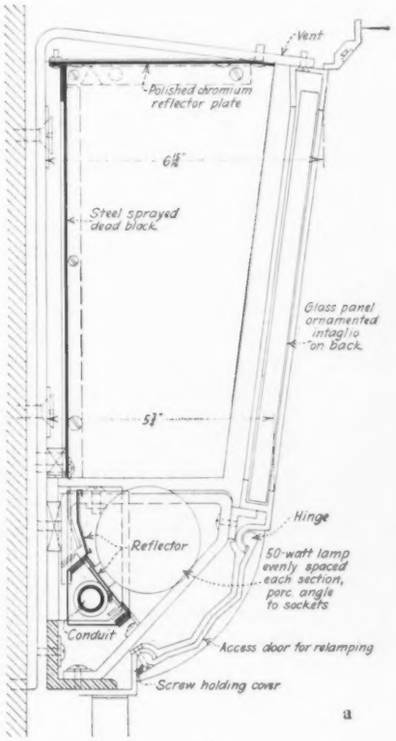
ing is continuous for these lengths, being joined, where necessary, by spot welding to a small plate back of the joint, the joint being filled and smoothed. The reflecting top plate is also continuous for these sections and is joined in a similar manner. The housing is so designed that the top and back come together in a right angle and there are no visible connections inside.

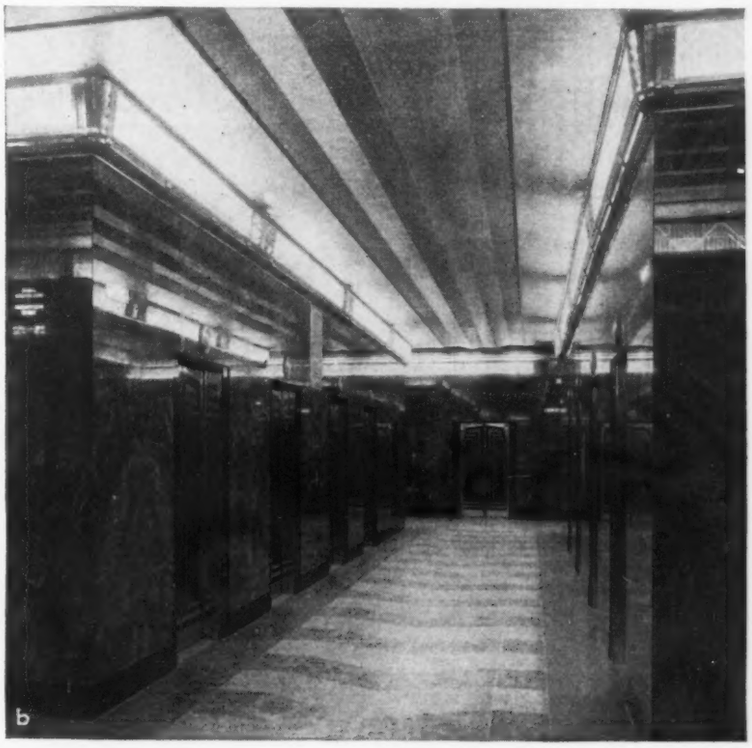
The rounded lower portion of the housing, below the glass, is in sections 3 or 4 ft. long pivoted at the ends to swing open for relamping. Each of these sections is held closed by a screw with a flush head. The glass also is in sections, which are held in place without vertical dividing bars or visible fastenings. In inserting the glass the top of the sheet is introduced into the upper member of the metal frame, which is deep enough to permit it to clear the lower part of the frame into which it is then lowered. Concealed springs in the vertical end members of the frame make it possible to press the sections of glass to one side when inserting or removing glass.

One of the minor features of the lighting lies in the treatment of the underside of the bridges that cross the

Shallow ornamental cove for elevator corridors

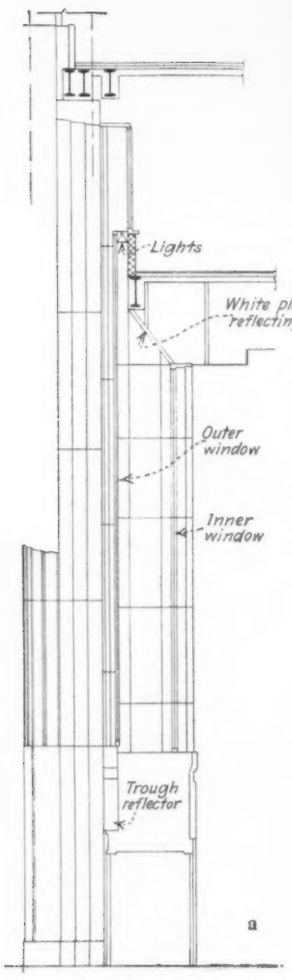
Glass panels ornamented with a frosted design in intaglio, behind which is a dead-black surface to display the glass design. Reflector in trough carries 50-watt lamps and illuminates ceiling. Top reflector throws light toward floor.

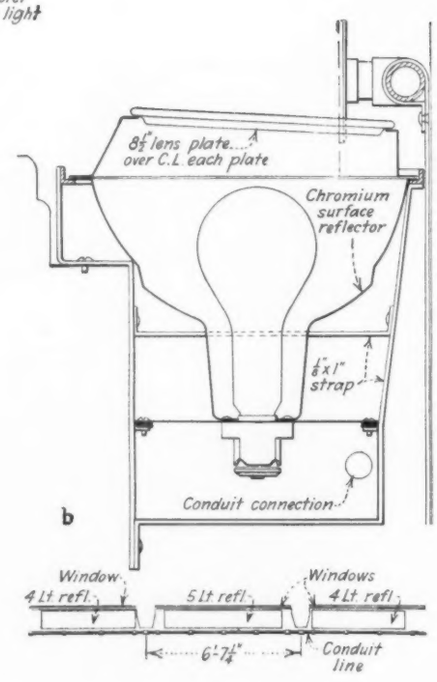




Lights between double windows in main entrance

(a) Interior illumination supplemented by units between double windows to equalize the distribution and (c) give the windows individuality and distinction. (b) Detail at right of installation at bottom of windows; (c) 200-watt lamps in chromium-plated reflectors with concentric prism control lenses in continuous housings.





two-story halls to provide a connection across the corridors at the second floor level. Here the soffits are of boldly corrugated aluminum and below them are longitudinal trough reflectors with chromium surfacing, from which the light is thrown upward upon the soffits. Also, the lighting of the directory board is from a soffit above, so that the board is illuminated entirely by reflected light.

The main entrance to the building in the center of the Fifth Avenue front is a tall portal with a great window above the doors. This window is double, with a space about 3 ft. 6 in. deep between the inner and outer windows. The end walls in the space are covered with marble, like that on the walls of the entrance lobby, because the glass of the inner window is clear, permitting a view of this space. Beneath and close to the outer window is a line of three trough units with corrugated continuous chromium reflectors and containing 50-watt lamps on 1-ft. centers.

The light is directed upon a slanting white painted plaster surface placed at the top between the two windows. The slanting surface reflects the light downward and outward through the outer window and mainly through the upper part. This equalizes the illumination of the window as seen from the outside by lighting the top, which does not receive as much light from within the entrance lobby as the lower part does. There are four marquises and these have panels of translucent glass set flush in the under surface.

The architects were Shreve, Lamb & Harmon. Meyer, Strong & Jones were the consulting electrical engineers and L. K. Comstock & Company, Inc., were the electrical contractors. The reflector lighting described herein was by the Frink Corporation. The searchlights in the dome were designed and furnished by the General Electric Company. Various lighting fixtures were furnished by the following: Cox, Nostrand & Gunnison, Inc., the Robert Phillips Company and the Black & Boyd Manufacturing Company. The ornamental glass described was furnished by the Corning Glass Company.

Hostile Press Imitates Utility Holding Company*

By WILLIAM H. HODGE
Vice-President
Byllesby Engineering & Management Corporation, Chicago

Masked in the attack on a non-existent "power trust" is a well-organized and determined effort to—

deny the right of free speech
destroy the right of the individual to own property.

THE organized attack upon the power companies is carried on, with the assistance of certain men in high public positions, by five interlocking organizations, namely: The League for Industrial Democracy, the Public Ownership League of America, the National Popular Government League, the People's Legislative Service, the Socialist Party. It is aided in small cities and towns by the representatives of certain manufacturers of Diesel oil engines. For complete and documented information concerning the five organizations mentioned I refer you to a 96-page pamphlet "The Radical Campaign Against American Industry," published by the National Electric Light Association. The activities of certain—not all—oil engine manufacturers to foment municipal ownership agitations for the purpose of selling their products are widespread and well known.

Under the radical program the farm lands of the country, the banks, communication services, utilities, coal and oil resources, insurance, railroads, ships, manufacturing and merchandising—in brief, all the sources, tools and machinery of production and distribution would be owned and operated by a nebulous and mythical thing called "the state."

Just what would be done with the newspapers is not so clearly defined. With everything else, including radio, telephone and telegraph, in the hands of the state it hardly would matter. No newspaper with opinions contrary to those of the state could exist. Free opinion and free speech would be a thing of the past, just as they have ceased to be under the collectivist program in Russia.

No leader in the electric power business advocates trying to muzzle the voice of the Socialist so far as I know. For my part I wish that a full explanation of the Socialist program—in so far as it can be authentically explained—could be carried to every citizen able to understand words of more than two syllables. To back up my statement I would ask you to read a book recently published by Norman Thomas, the last candidate for President on the Socialist ticket. It is called "America's Way Out; a Program for Democracy." You will find it interesting. It may not convert you to Socialism, but it will leave you with an appreciation of Mr. Thomas' kindliness of heart, even if you cannot follow his dreamy philosophy.

Every one knows that a complete socialistic plan would be voted down overwhelmingly if submitted to the American people. So the campaign takes the form of obtaining the objective little by little, municipal, district, state or national, beginning with the industries which they believe are the most vulnerable—those concerning which prejudices may be most easily aroused. Their leaders have so declared.

The main tactics are guerrilla warfare to harness, obstruct and wear down public good will toward industry—weaken the efficiency and financial stability of industry—then to proclaim industrial failure, and finally to close in. They have made considerable progress. The big present objective is the power business, but they are willing to tackle anything from gasoline-filling stations to the grain trade and the great insurance organizations. They have historical precedent for believing that minorities can impose their will in this republic.

In the effort to tear down the power companies and advance public ownership all rules of fair play or sportsmanship have been abandoned. From United States senators down a desperate attempt has been made and is now in progress to frighten the power companies, and those who see something good in them, into silence. Every conceivable trick is employed to prevent the power industry from saying anything in its own behalf, or calling attention to the misstatements and false conclusions of the opposition.

The term "power trust" is the advertising slogan of politicians trying to sell a new political steppingstone to the electorate.

The holding company method is subject to abuse, just as any other useful instrument of progress. Holding companies that are unsound fall of their own defects—for example, the Foshay organizations. They cannot weather financial adversity, incompetent management

**Excerpts from address at Fairfield, Iowa, on Parsons College Journalism Day.*

poor engineering, public ill-will, or the regulatory inquisitions of governmental commissions. If the rates of the operating subsidiaries of a holding company do not yield a fair return on actual investment the parent holding company cannot long survive. Herein lies the reason why states and municipalities need not sacrifice their powers of intimate regulation to a centralized federal authority far removed.

Hearst press has holding company

Leading in the onslaught on utility holding companies and advocating the public ownership of utilities we find the Hearst press. What is the Hearst press? In their own language "his publications constitute the greatest publishing business ever built up." I am quoting from an official circular dated July 1, 1930, describing an issue of 2,000,000 shares of Hearst Consolidated Publications, Inc., $50,000,000 par value.

This company is a *holding company* which, quoting from the circular, "has been organized under the laws of Delaware and will own as a result of this financing, through entire stock ownership, the following newspapers of nationwide prominence and of the highest standing in their respective communities, namely, New York *Evening Journal*, Chicago *Evening American*, Pittsburgh *Sun Telegraph*, Detroit *Times*, San Francisco *Examiner*, San Francisco *Call-Bulletin*, Oakland *Post-Enquirer*, Los Angeles *Examiner*, Los Angeles *Evening Herald*, Seattle *Post-Intelligencer*, *American Weekly* in addition to above."

Here we find the chief antagonist, editorially, of the utility holding company using this self-same plan of organization for his widely scattered, centrally controlled and directed newspaper properties. Not only this, but he has adopted a well-known public utility innovation; that is, the cultivation of employee and customer ownership, and it is apparently by such method that the 2,000,000 shares of Hearst Consolidated Publications, Inc., are being marketed. Let me again quote from the circular which is before me:

"For several years Mr. Hearst has studied the plan of employee and customer ownership, developed so successfully in this country and England by public utility corporations, as well as by several outstanding publishing concerns. He has been convinced that there is a definite and valuable asset to these businesses in widespread financial interest on the part of officers and employees as well as on the part of the public generally."

Here are a few advertisements clipped from the Chicago *Herald and Examiner*, offering the "7 per cent cumulative participating class A stock of Hearst Consolidated Publications, Inc., price $25 a share—$5 a share down; $2 a share monthly. Payments earn 7 per cent interest from the day received." Incidentally, this stock does *not* carry full voting rights, which observation may be of interest to Harvard's Professor Ripley.

And here is another official circular of another Hearst holding company, Hearst Magazines, Incorporated, dated September 12, 1930. And this particular holding company owns stock in one or more other holding companies: "Hearst Magazines, Incorporated, owns all of the outstanding stock of International Magazines Company, Inc., which, either directly or through wholly owned subsidiaries, publishes *Good Housekeeping*, *Cosmopolitan*, *Harper's Bazaar*, *Motor and Motor Boating*."

Also, I call to your attention financial descriptive circulars covering the following: Hearst Publications, Incorporated, $20,000,000 (closed issue) first mortgage and collateral trust 6¼ per cent serial gold bonds; Chicago *Herald and Examiner*, $5,000,000 6½ per cent secured gold debentures; Detroit *Times*, $2,500,000 6 per cent serial gold debentures; Omaha *Bee-News*, $2,500,000 serial gold debentures.

What I would like to know is why a chain of utilities should be considered any more iniquitous than a chain of newspapers; why should the holding company plan of ownership and operation be denounced as against public interest in the case of the utilities and held consistent with public welfare when applied to newspapers?

Group or syndicate management is made possible by holding companies. It is decidedly interesting to trace the similarity of group management methods in utilities and newspapers. Take Arthur Brisbane, for instance, with his reported income of $260,000 a year from syndicated editorials—an amount vastly greater than the salary of any power company executive I ever heard of.

There is not a newspaper printing Mr. Brisbane's editorials which singly and alone could afford to pay him a fraction of what he is clearly able to earn. The newspaper obtains extraordinary literature by application of the group principle. Many newspapers clubbing together, each defraying part of the cost, can obtain superior services, just as power companies secure the assistance of the best engineering brains and experience.

The parallel may be extended a long ways. Briefly, however, compare the utilities' general sales departments with the newspapers' national advertising and circulation departments; utilities' advertising copy and supervision service with the syndicated features, cartoons and comics; the application of modern accounting methods for comparing operating efficiencies with complicated cost finding to determine the value of advertising space; consolidated purchasing power in turbines and copper wire with centralized buying of presses, newsprint and ink. And in supplying adequate personnel, both are able to assign quickly the right man to the right place, temporarily or permanently, whether it is a power plant superintendent, an editor, a business manager or the one available man who can get a new color press to operating smoothly.

Again, I ask, if these things are good for newspapers, why are they bad for power companies?

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Footcandle-by-Footcandle

By M. LUCKIESH
Director Lighting Research Laboratory
General Electric Company, Cleveland, Ohio

Although the reactions of the visual sense and the human machine to quantity of light are very intricate and diverse, it has been established that many of these reactions follow a common and fundamental law. An analysis of data accumulated by years of research indicates that this fundamental law is approximately loga-

rithmic in character or, in general, that the response to increased intensities of illumination follows the law of diminishing returns. For example, the improvement in visibility produced by increasing the level of illumination from 5 to 10 footcandles is approximately the same as that obtained by increasing the level of illumination from 50 to 100 footcandles.

Notwithstanding the scientifically recognized validity of this relationship, the lighting specialist usually hesitates to recommend levels of illumination which represent a wide departure from prevailing lighting habits. Instead, the levels of illumination which are visually desirable are being approached in a slow, arduous manner by advancing footcandle by footcandle.

It is recognized that the cost of attaining visually desirable levels of illumination has been a significant factor in retarding illumination progress. However, a broad knowledge of both the measurable and unmeasurable benefits of good lighting is of material assistance in reducing the importance of this economic handicap. Present levels of illumination have been justified and attained largely upon a basis of increased efficiency in the work-world.

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Frequency Control Mounted to Minimize Vibration

By K. N. REARDON and H. A. P. LANGSTAFF
Switchboard Engineer and Electrical Engineer, Respectively, West Penn Power Company

The 180,000-kw. Windsor power station, jointly owned by the West Penn Power Company and the Ohio Power Company, is so situated that it is admirably suited to act in a frequency regulating capacity for the extensive transmission system of both the ownership companies. Accordingly, when the need of a continuous flat frequency became increasingly evident, automatic control equipment was installed there by the West Penn company.

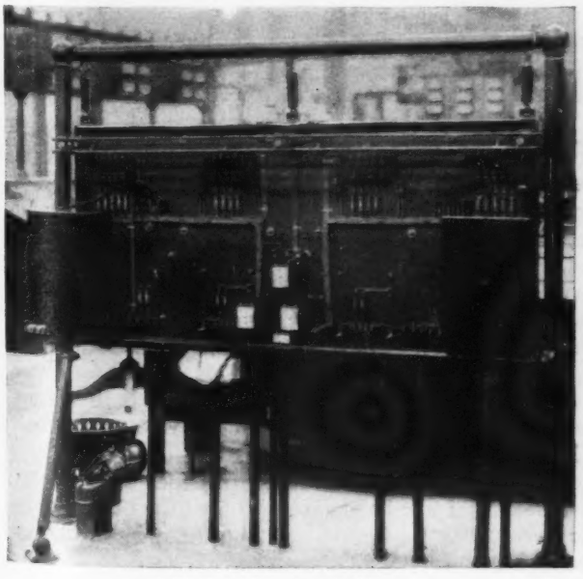
There being considerable vibration in the plant, particularly when a unit is being synchronized, a means of damping out its effect was sought in the mounting of the frequency-control equipment. Otherwise the precise balance of the galvanometer elements would be disturbed, resulting in false frequency deviations. As shown in the illustrations, the method chosen was that of suspending the panel and equipment by springs from a pipe framework. These springs were selected so strong that any two could easily carry the weight suspended and yet stiff enough to take up vibration without tending to assume a natural vibration period. Very good results have been obtained from this method of panel mounting.

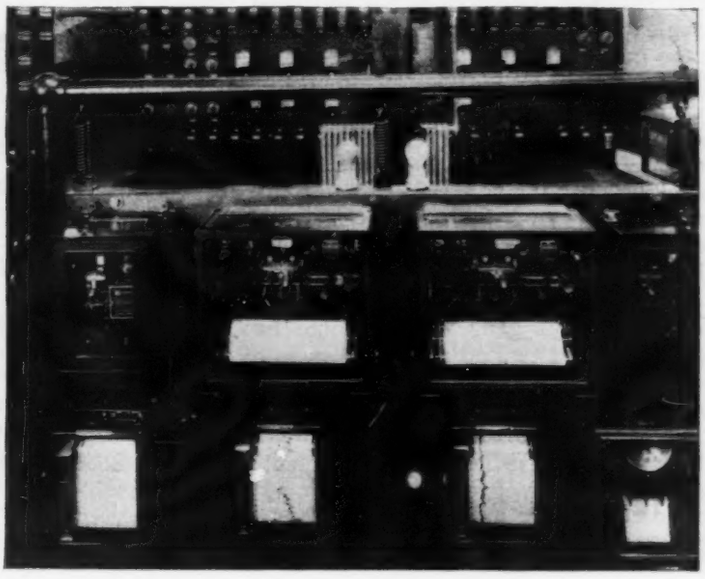
The frequency-control equipment is applied to all six units, with ready means provided for selecting those units with which it is desired to regulate frequency. This installation is one of frequency control only, with no facilities provided for proportionate load division, economic load scheduling or other refinements. For nearly two years excellent results have been obtained from this installation. At the present time improvements and additions to the scope of this equipment are being made and temporarily mounted elsewhere is complete frequency and proportionate load control equipment for automatically adjusting the governors of three of the six units. Throughout the coming summer operating tests will be made and data will be obtained which, it is believed, will be of interest and value to operating men throughout the country.

Front and rear of spring-mounted frequency-control panels

Leeds & Northrup frequency control and frequency recording instruments are supplied in duplicate, the former being on the ends and the latter in the center of the upper row. Switches are conveniently located so that duty may be transferred quickly from an active instrument to the spare. This arrangement protects against loss of control or record due to equipment failure; it is also valuable from a maintenance standpoint.

The instrument on the right end of the lower row is a Warren time-deviation recording meter, through the use of which integrated loss or gain in system frequency is recognized. This enables proper adjustments of the sensitive frequency controllers to be made. The Esterline instruments, to the right and left of the center, record the station output to the Ohio Power Company and to the West Penn Power Company, respectively. At the left end is an Esterline graphic meter with a high-speed attachment which records fault current through the grounding resistor of the West Penn Power Company 25-kv. transformer banks.





Tower Erection Methods Expedited Hoover Dam Line

By R. H. HALPENNY
Electrical Engineer Southern Sierras Power Company

Preliminary planning, programming of construction work, transportation and distribution of equipment and camp facilities that contributed to the erection of the 225-mile, 132-kv. Hoover Dam line in 225 days were discussed in a previous issue.*

Base sections of the H-type structures and the stubs, or footings, of the A-type towers were assembled in material yards at distribution points and dipped in a hot bath of asphalt. This resulted in cheaper labor cost than possible with field assembly, since work was done under more convenient conditions and with maximum efficiency. A truck equipped with boom and winch was used to handle the bases during the dipping process.

Digging holes for tower bases was done by tractor-mounted earth-boring machines where soil conditions permitted. About 65 per cent of the holes on the entire line were dug with this type of equipment. The bases of the H-structures were of such design that a 30-in. auger hole was large enough after the top of the hole had been squared out by hand. The earth broken down by hand was, for the most part, removed by the auger during the boring operation. More than 30 per cent of the holes required the use of explosives in excavating. Many of the locations required excavation in solid rock and a portable air compressor drawn by tractor was used in these sections.

For placing bases and stubs, wooden templet bars were used. These templets were equipped with iron plates provided with welded-in bolts to engage the bolt holes in the bases. The operation of setting the two base sections of an H-structure was comparatively simple; the bases with templet bars attached were lifted and placed in the holes by eight men, who afterward leveled, aligned, backfilled and tamped. The A-type tower stubs required more work, since the four legs formed a rectangle and involved a more elaborate templet system and more careful leveling.

The steel erecting crews closely followed the base-setting crews. To expedite the erection, two scouts preceded the erectors and prepared the steel so that it was in convenient position for sending aloft. In addition to breaking open the bundles, arranging the steel and opening the boxes of bolts, these scouts carefully checked all materials to make sure that there would be no delay when the erecting crew started work.

Steel erection gangs consisted of twelve men under a foreman. This gang was split into two crews of six men each, and two adjacent towers were erected at the same time by a gang, four men working aloft and two on the ground at each two-mast tower. Ordinarily six crews were employed and the work was arranged so that there was a certain amount of competition among them as to the number of towers erected in a day. An experienced crew of six men could erect four H-structures per day and frequently exceeded this figure. In all cases towers were built up from the ground by first bolting the vertical members of the lower section in position and then adding the diagonal members as the two erectors ascended. This method was used because much of the country traversed by the line was so rough that it would be uneconomical to assemble the towers on the ground and transport and set up the equipment necessary for raising the completed structure. This conclusion was based on cost data obtained on similar lines built within the last two years where very accurate cost comparisons were kept of the two methods.

The erecting crew, after completing the tower, hung the insulators and line hardware, installed the bird guards and left everything in condition for the wire-stringing crews.

Building as they climb

Four erectors and two helpers fabricate each 52-ft. tower piece by piece from the ground up. Rough country for much of the distance made assembly on the ground and raising impracticable.

Digging 7-ft. holes for tower bases

The 30-in. auger hole was squared out by hand at the top to receive the asphalt-dipped footing sections.

*"Electrical World," July 4, 1931.

Insufficiency of Power Will Delay Russia's Rise

Soviet Russia's electrical generation under the five-year plan will be 26,000,000,000 kw.-hr. in 1933 if the plan becomes accomplishment. In that year the United States figure will be near 134,000,000,000 kw.-hr. With Russia applying one-fifth as much power to supplement labor in production, and that with a larger population, can the Soviet Republic be a formidable industrial competitor of the United States of America? This question is made the focus of Robert Sibley's "America's Answer to the Russian Challenge," just published by the Farallon Press.

The former dean of engineering at the University of Montana and a delegate to the second World Power Conference puts forth in his book the startling claim that electric power, and all that goes with it, furnishes a yardstick by which the Soviet industrial threat can be measured.

"The total generation of electrical energy in Russia during 1913 was 1,925,000,000 kw.-hr.," he writes. "By 1928, at the beginning of the five-year plan, this had risen to 5,180,000,000 kw.-hr., and at the end of the five-year period it was estimated to be 26,000,000,000. In America, as far back as 1913, the total electrical energy was 14,000,000,000 kw.-hr.; by 1928 this had risen to 77,000,000,000, and at the same rate of increase during the last two years, by 1933 it will rise to the huge total of 134,000,000,000 kw.-hr. Hence, granting that the five-year plan is successful, Soviet Russia will be far, far from overtaking the American program.

"Again, in the size of units of power development, one hears on all sides in Russia that when the Dnieprostroy is completed Russia will have the largest single hydro-electric generating station in the world. One single river in the United States, the San Joaquin in California, has upon it, aready developed, a series of power plants totaling almost 1,000,000 hp. installed capacity. In total, this project on the San Joaquin—a river less than one-tenth the volume of the Dnieper—exceeds the accomplishments of the world-famous Dnieprostroy. When other rivers of even this one state are taken into account the total power of district units and the per capita consumption of electricity outranks so far any accomplishment of the five-year plan as to make Russia's great enterprise sink into insignificance in comparison."

[Dnieprostroy is 700,000 hp. The Beauharnois development, near Montreal, is 500,000, with an ultimate capacity of 2,000,000 hp., asserted to be the largest power site in the world which can be developed in a single power house.—EDITOR.]

"Further than this, it is interesting to note that, according to official statements, the average cost of electric energy in Russian currency per kilowatt-hour in 1933, when her vast economic program will be completed, will be—at the consumer's end of the line—about 1.75 cents per kilowatt-hour. This allows nothing for taxes, because the entire project is government owned. On the other hand, there was delivered last year to 49,067 farms of California 956,000,000 kw.-hr. at a cost of only 1.41 cents per kilowatt-hour, even when state and federal taxes, amounting to almost 10 per cent of the sale price, had been paid by the companies.

"If the ultimate and final awakening of Soviet Russia is ever brought about," Mr. Sibley writes, "she will find herself as a nation possibly still calling herself Soviet Russia, but to all intents and purposes American to the core in education, in ideals of homes and, above all, in the burning desire to press forward under the undying urge of the highest type of individual initiative. Whether Russia can ever succeed in this way may be problematical; that she can succeed in no other way is certain."

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GOOD-WILL SERIES

Only God Can Make a Tree*

By H. A. MARTIN

Chief Engineer Peoples Light & Power Company

Tree trimming should be done in such a way as not to harm the life and beauty of the tree. No stubs of limbs should be left that may rot into the heart of the tree. Never "carpenter" or "plane" a tree off leaving all limbs of same length and do not leave a tree lopsided nor with a large V-shaped cut through the limbs. It is not advisable for a property owner to trim his trees for the company on account of his inexperience in the work and the likelihood of his thus producing a poor appearing job, and on account of the possibility of a serious accident.

Remember that each tree-trimming job well done and of neat appearance makes it easier to obtain permits for the next one. Permission should always be obtained for tree trimming and preferably the owner should be present when the work is being done. If you have some good jobs of tree trimming, take photographs of them beforehand and then after they are finished present these to your customer when requesting his permission to trim trees. A sketch showing your plans of trimming helps in getting the permit.

An understanding of electric distribution and a knowledge of trees, a tactful, clear presentation of the problem with a thoughtful consideration of the customer are necessary to get the permit. It should be explained that the trees are not to be ruined, all rubbish is to be removed and the work neatly and efficiently done by experienced men. It should be made plain to the customer that tree trimming is, in some cases, necessary to furnishing good service. Limbs on the wires are likely to cause interruptions to service, especially during wet weather or storms. Radio interference is often caused by contacts of trees on wires. There is also an element of danger in contact between limbs and wire, in that some one in contact with the tree might receive a shock or a wire might be broken by the rubbing and pressure of the limb.

The conservation of the trees and the maintenance of satisfactory service are matters of concern both to the public and the utility. It is to be borne in mind that the type of tree-trimming policy of the utility has a direct effect on the utility's relations with its customers and a concerted effort should be made to do this work to the satisfaction of the tree owner.

**One of a series of utility employee instruction sheets developed by the Peoples Light & Power Company to bring about greater consideration of customers' interests.*

Defective Equipments Cause Low-Voltage Fatalities*

By MORTON G. LLOYD

Chief Section of Safety Standards, Bureau of Standards, Washington, D. C.

We have a record of 187 instances of fatal accidents which have occurred, according to the best available information, by contact of the human body with circuits not exceeding 240 volts, and a large majority (70 per cent) of these have occurred at 110 or 120 volts. The accompanying tables show how the accidents have been distributed according to location and also how they may be classified according to the existing conditions.

More than half of the fatalities have occurred in industrial locations and slightly more than one-third in domestic locations. There are fourteen other cases which did not seem to come under either one of these headings.

The largest group of industrial fatalities are those resulting from the use of portable lamps and extension cords. This group represents more than a third of the total. In some cases a brass-shell socket has been used and has become alive; in other cases the cord has become worn until it exposes the conductor to contact. Most of these cases arise where the victim is standing upon the ground or some wet surface or is working inside of a boiler or some similar job which affords a good connection to ground under conditions where the hands are liable to be wet with moisture or perspiration. These deaths could have been prevented by proper planning.

The ordinary lamp cord and brass-shell socket is not the proper equipment to use under such circumstances, but this fact does not seem to be generally known in industrial plants. A type S cord, a non-conducting socket and a lamp guard would probably be sufficient to avoid fatal accidents of this type. Attention is called to rule 1405(c) of the National Electrical Code, which calls for the use of weatherproof sockets in damp places, and to rule 374(c) of the National Electrical Safety Code, which requires portable lamps in damp places to be equipped with a socket of non-combustible, non-absorptive insulating material, an approved handle of non-absorptive insulating material, a basket guard and approved cord.

**Excerpts from paper presented to Western Section, International Association of Electrical Inspectors.*

Table I—Location of Low-Voltage Fatalities

Industrial Locations		Domestic Locations	
Portable cords and lamps	38	Bathtub cases	23
Portable appliances	14	Other portable appliances	6
Exposed wires	26	Wet basements or earth	22
Exposed switch	3	Miscellaneous	17
Ungrounded parts	3		68
Working with parts alive	13	Other locations	14
Miscellaneous	8		
	105		
Total			187

Table II—Conditions Surrounding Low-Voltage Fatalities

Involving defective equipment	80	Handling live parts	19
Equipment damaged at time of accident	11	Aerials and other amateur	9
Involving code violation	14	Other improper procedure	16
Exposed wires	27	Not otherwise classified	11
Total			187

Portable appliances attached to extension cords have been responsible for fourteen additional fatalities. These usually result from the frame of the portable appliance becoming alive through defective insulation. The appropriate preventive is to ground the frame of the portable appliance or motor. It is quite feasible to do this in industrial locations by the use of an additional wire in the extension cord and special plugs and receptacles designed for the purpose. The National Electrical Code calls for this at present only when the voltage exceeds 150. Another method of providing grounding is the use of cord having a flexible armor. This serves also to give mechanical protection to the cord conductors whose insulation is then unlikely to be damaged.

A dozen years ago a list of this kind would have included numerous cases of contacts with exposed switches. This hazard has, fortunately, been largely eliminated, so that only three cases below 240 volts were found in these records. The rather common practice of making repairs upon live circuits or handling live parts unnecessarily is responsible for thirteen fatalities.

Among the domestic locations the list is headed by the so-called bathtub cases. Most of these involve the use of an electric heater in the bathroom. Either the heater or its extension cord is handled with wet hands or possibly the heater falls into the tub, as was known to happen in one case. Inasmuch as we cannot hope to get in domestic installations the special cords recommended for industrial purposes, the best alternative appears to be to keep portable appliances out of the bathroom.

Second in number of fatalities are the cases listed as occurring to persons standing in wet basements or upon the ground outside. It would seem reasonable to place in the National Electrical Code a rule requiring that all fixed and semi-portable equipment in damp locations should be grounded regardless of the voltage.

Turning to Table II, it is evident that about one-half of the fatalities here considered are due to equipment which is either defective or which is damaged at the time of the accident so that it becomes defective.

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Cost of Opening and Closing Customers' Accounts

A comprehensive analysis of the time required and itemized cost of opening and closing customers' accounts during 1930 on the system of the Suburban Gas & Electric Company, Revere, Mass., resulted in an average of $2.25 for 12,140 new accounts and 12,107 accounts closed, omitting overhead, rent, light, heat, telephone, water, supervision, bad debts, collections, use of typewriters, adding machines, etc. The foregoing figure covers actual out-of-pocket expenses for office labor and printed forms and the company estimates that if all charges are included the cost is at least $3 per account opened and closed.

The time required to open and close accounts has been broken down into about 55 items of "unlock" procedure aggregating 120 minutes and 39 "lock-and-shut-off" items totaling 90 minutes. Forty-four office forms are required in these transactions. The time analysis and cost of forms used in 1930 are shown on opposite page.

Connection and Disconnection Procedure, Suburban Gas & Electric Company

(Management of Charles H. Tenney & Company)

Unlock Procedure

Operation	Form Number	Time in Minutes
Recording information on contract	0166	13
Information for change of address	0166	2
Discontinued account clerk checks credit	0166	3
Approving credit	0166	1
Contract filed in order department	0166	1
Completing contract information	0166	1
Filing contract	0166	½
Recording information on room card	275 R	1
Filing room card	275 R	½
Recording information on consumer's appliance service card	266	2
Information completed in order department	266	3
Recording information in sales department	266	2
Record file clerk	266	1
Issuing office work order	303 GE	2
Credit clerk initials order	303 GE	½
Order department clerk locates meter book	303 GE	5
Entering meter information on order	303 GE	1½
Order filed in department	303 GE	1
Copies of orders matched and arranged geographically	303 GE	6
Entries in meter record book and stamping completed	303 GE	6
Entries on completed order transferred to meter book	303 GE	5
Preparing plate on graphotype		5
Printing ledger cards and salesmen's report and card		2
Inserting plate and card in frame and filing		3
Meter information, etc., entered on ledger cards		4
Filing order	303 GE	1
Filing duplicate where order is complete	303 GE	3
Teller issues deposit receipt	010 A	3
Records data on contract	010 A	2
Forwards tissue to be filled	010 A	1
Deposit cards listed on tally sheets	4	2
Bookkeeper records deposit information	1610 L	2
Deposit card filed geographically	010 A	1
*C and D cards listed on tally sheets	RR 30	2
Teller issues C and D receipt	RR 30	3
Records data on contract	RR 30	2
Forwards tissue to be filed	RR 30	1
Bookkeeper records C and D deposit information	1610 L	2
C and D cards filed geographically	RR 30	1
Bookkeeper checks deposit data	4	2
Tally sheets filed	4	1
File in geographical order	1610 L	1
Entries in record book	132 MB	2
Summarizing orders for month	132 MB	3
Bookkeeper section deposit card	311	1
Bookkeeper's entries recorded and summarized	311	3
Information filed	311	1

*Connect and disconnect.

Operation	Form Number	Time in Minutes
Bookkeeper section C and D card	RR 31	1
Bookkeeper's entries recorded and summarized	RR 31	3
Information filed	RR 31	1
Total		120

Lock and Shut-Off Procedure

Operation	Form Number	Time in Minutes
Issuing office work order for discontinuance	303 GE	4
Locating meter book in order department	303 GE	5
Records meter information on order	303 GE	4
Filing order in department	303 GE	1
Workman completes order	303 GE	1
Matching both parts of order	303 GE	3
Arranging orders	303 GE	4
Recorded on tally sheet	132 MB	1
Final entries in meter reading book	0161 L	1
Information checked by clerks	303 GE	2
Order filed	303 GE	1
Duplicate order arranged alphabetically	303 GE	1
Matched with original order	303 GE	2
Duplicate arranged alphabetically, stamped and filed	303 GE	3
Preparation of final bill	0100 D	3
Bookkeeper's entries closing account	0100 D	8
Entry for returning deposit	0100 D	4
Check for return of deposit	132 B	1
Balance due, recorded in collection department	155 W	2
Stub issued for deposit as part payment of bill	0100 D	1
Cash book entries	0100 D	2
Teller's entries on tally sheet and summary	4	½
Verifies tally sheet entries	4	½
Post entries on ledger card	1610 L	1
Cash stub forwarded to file	0100 D	½
Tally sheets placed in binder	4	½
File clerk rearranging cash stubs	0100 D	½
Check for return of deposit typed	0119	2
Cash book entries made for check	132	1
Signature on check deposit sheet initialed	132	½
Counter signature on check	0119	½
Inserting in envelope and mailing check	0136 C	½
Entries for return of deposit	132 B	2
Initial return deposit sheet	132 B	1
Card typed for unpaid balance	155 W	4
Placed in alphabetical file	155 W	1
Check for payment and further information address	155 W	3
If account is unpaid, collection procedure started	0199	3
Bookkeeper memo to six additional clerks		3
Remove card and plate from frame		5
Total		90

Cost of Opening and Closing Forms per Year, Suburban Gas & Electric Company

Form Number	Description	Number Used, 1930	Cost
0166	Order for gas or electric meter	8,257	$18.17
275 R	Room record card, residential	5,863	8.79
266	Canvasser's date sheet	8,340	12.51
303 GE	Office work order for gas or electric meter	6,724	11.43
010 A	Deposit ledger and receipt	3,532	20.49
RR 30	Connection and disconnection	4,869	41.39
4	Tally sheet, deposits	220	3.45
4	Connect and disconnect payments, tally sheet	35	55
	Addressograph frames	195	3.08
1610 L	Ledger cards, individual gas and elec. accts.	11,914	53.61
132 MB	Meter record sheet	423	9.01
311	Bookkeeper's section deposit card	825	2.97
RR 31	Bookkeeper's section C and D card	525	4.20
0100 D	Combination bill and statement	8,113	21.09
0119	Deposit return check	4,162	4.99
132 B	Return deposit sheet	178	3.12
155 W	Unpaid discontinued account	6,084	13.99
0199	First letter discontinued account	1,800	6.84
0200	Second letter discontinued account	1,500	11.25
0176	Attorney's statement	711	5.55
314	Attorney's file envelope	711	7.82
178	Subject letterhead	37	0.06
319	Attorney's collection report	40	0.10
257 S	Automobile time card and report	156	0.55
188	Expense slip	100	0.12
RR 16	Work order meters gas or electric	3,448	23.79
162	Meter tag, gas or electric, install	1,773	2.66
62 L	Meter record card (gas, regular)	669	0.27

Form Number	Description	Number Used, 1930	Cost
63	Meter record card (prepayment gas)	15	0.06
59 L	Meter record card (electric)	467	1.40
56	Systematic test follow card (electric)	467	1.21
RR 11	Service slip	2,500	4.75
163 S	Meter slip gas or electric, remove	1,674	2.01
0100 D	Part payment by deposit, final bill stub	6,084	4.87
58 W	Systematic test follow card (gas)	669	0.20
	Addressograph plates	8,340	19.18
	Addressograph cards	8,340	5.84
0161 L	Meter slips	2,307	5.08
0136 C	Large outlook envelopes	4,162	3.33
177	Blue letter book copy	37	0.07
184	Copy for letter book	37	0.07
187	Copy letter	37	0.04
	Postage on discounted bills	9,199	183.98
	Add 5 per cent for waste	.....	17.00
	Total		$540.94

Cost Summary

	Per Account Unlock	Per Account Lock		
Clerks' time	$0.91	$0.68	12,140 new accounts at $1.226	$14,900
Workmen's time	0.21	0.20	12,017 accounts closed at $0.986	11,820
Additional clerks and forms	1.06	1.06	Total	$25,720
	$1.226	$0.986	Approximate cost per account,	$2.25

Range-Wiring Costs Reduced 30 per Cent by New Assembly

By E. A. BRAND

Buffalo, Niagara & Eastern Power Corporation, Buffalo, N. Y.

AS THE result of an active study of ways and means to reduce range-wiring costs on the Niagara Hudson system, initiated some months ago, the following facts soon developed:

1. No satisfactory reduction in total cost could be effected by attacking merely one or two of the items involved. Each by itself represented too small a proportion of the total cost.

2. Certain of the materials and methods in common use should be replaced if possible, as being fairly high-cost items and involving considerable labor.

Accordingly the entire wiring system, beginning at the weatherproof fitting on the outside of the building and ending at the connection to the range, was studied from the following angles:

1. Simplification and modernization of the installation practice by eliminating assembly labor on the job wherever possible and by the substitution of modern materials and methods for traditional ones.

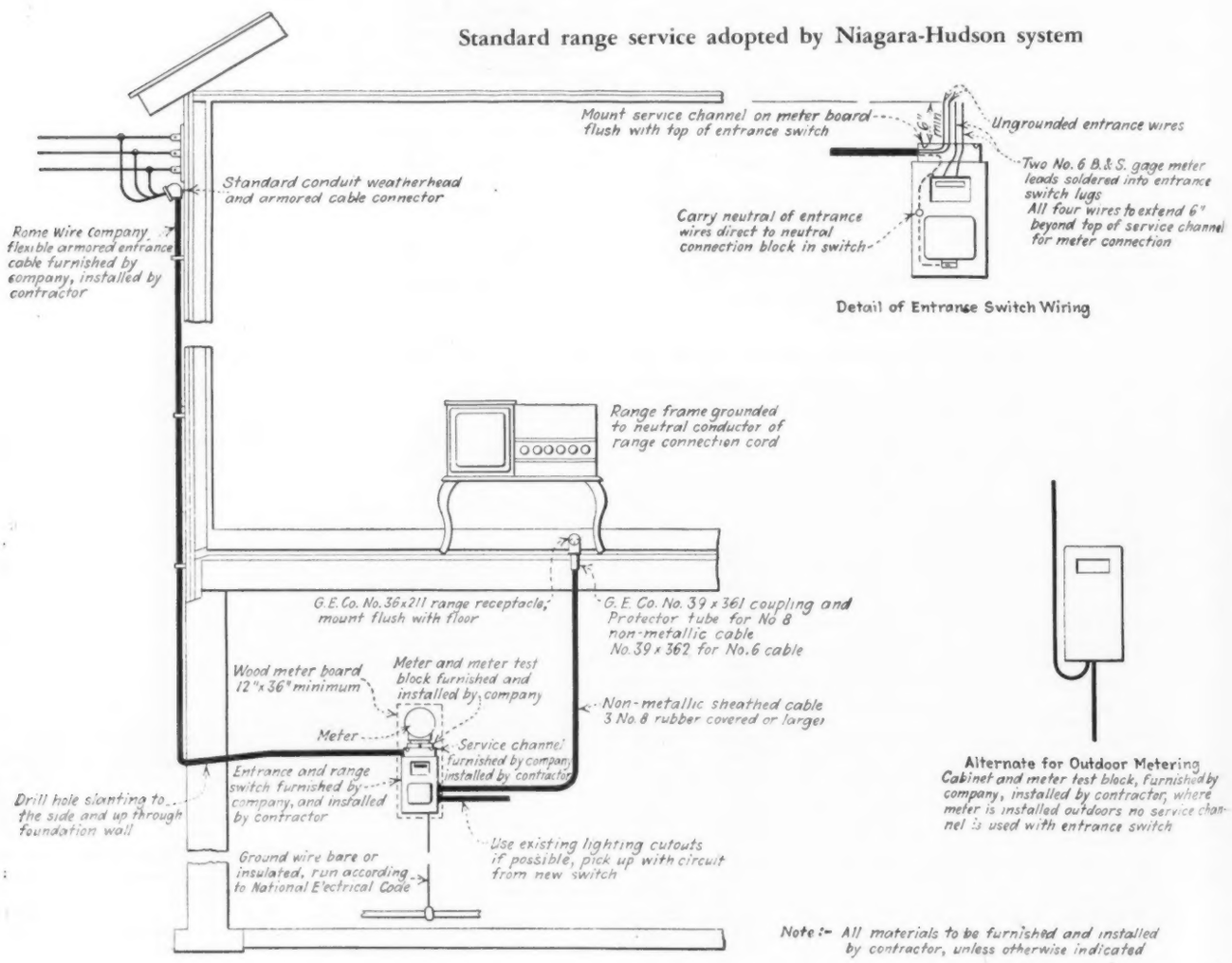
2. Maintenance of a satisfactory safety standard with a high degree of convenience to the customer.

These investigations resulted in a standard range entrance and feeder, consisting of four major units:

1. An armored service entrance cable to replace the usual conduit entrance.

2. A combination switch unit, with all protective and switching equipment in one cabinet, and with simplified meter switch requirements.

Standard range service adopted by Niagara-Hudson system


Mount service channel on meter board flush with top of entrance switch
Ungrounded entrance wires
Two No. 6 B.& S. gage meter leads soldered into entrance switch lugs
All four wires to extend 6" beyond top of service channel for meter connection
Carry neutral of entrance wires direct to neutral connection block in switch
Standard conduit weatherhead and armored cable connector
Rome Wire Company flexible armored entrance cable furnished by company, installed by contractor
Detail of Entrance Switch Wiring
Range frame grounded to neutral conductor of range connection cord
G.E.Co. No.36x211 range receptacle; mount flush with floor
G.E. Co. No. 39 x 361 coupling and Protector tube for No 8 non-metallic cable No.39 x 362 for No.6 cable
Wood meter board 12"x36" minimum
Meter and meter test block furnished and installed by company
Non-metallic sheathed cable 3 No 8 rubber covered or larger
Meter
Service channel furnished by company, installed by contractor
Entrance and range switch furnished by company, and installed by contractor
Drill hole slanting to the side and up through foundation wall
Use existing lighting cutouts if possible, pick up with circuit from new switch
Ground wire bare or insulated, run according to National Electrical Code
Alternate for Outdoor Metering
Cabinet and meter test block, furnished by company, installed by contractor, where meter is installed outdoors no service channel is used with entrance switch
Note:- All materials to be furnished and installed by contractor, unless otherwise indicated

3. A non-metallic sheathed cable range feeder to replace the usual armored cable or conduit job.

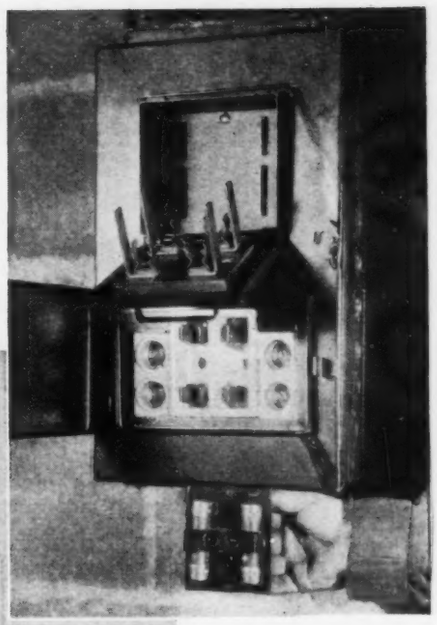
4. A polarized range receptacle with its cord and attachment plug, making a plug-in device of the range.

The armored service entrance cable, which was originally developed by the Rome wire division of the General Cable Company at the suggestion of the New York Power & Light Corporation, is factory assembled. It was approved in principle at the February, 1931, meeting of the electrical committee, National Fire Protective Association, and has just been listed by the Underwriters' Laboratories. Not only does it produce a saving in material cost but also reduces the labor cost of installation. At the same time it satisfies the required safety standard for a service entrance.

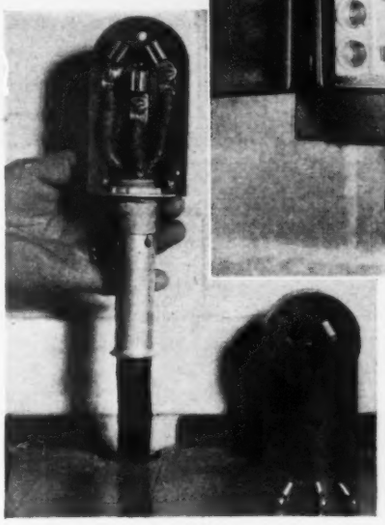
The combination American Electric Switch Company unit of 60-amp., 125/250-volt capacity contains the main switch and fuses, the range fuses and four branch circuit fuses in one cabinet. This replaces the miscellaneous equipment, consisting usually of a 60-amp. entrance switch and a separate surface cabinet containing the range fuses and a set of 30-amp. fuses to pick up the existing lighting branch circuits. The unit was further simplified by eliminating meter test facilities and the need for "accessible main fuse" construction. As shown in the accompanying illustration, it is entirely dead-front and arranged for convenient and safe replacement of the cartridge fuses. All internal busing connections are made at the factory, so that the contractor merely has to bring in the service, take off the load and reconnect the ground. Again, a substantial reduction in both material and labor costs resulted, with a more complete and a safer installation. If one of the four branch circuit positions is used to pick up the existing two-wire lighting cutouts, which are left in place wherever possible, then three spare positions remain for a water heater and additional lighting or appliance circuits.

Although at the present time the costs of armored cable and non-metallic sheathed cable are fairly close, the advantage rests with the latter. It can be expected that with equal production the non-metallic cable will always be more reasonable in price. The cost of grounding the range frame also affected the choice of the feeder from the meter switch to the kitchen. Although grounding of the frame is not required by the National Electrical Code, where the voltage is less than 150 to ground, manufacturers recommend it, and it is commonly practiced. It developed that grounding through the metal envelope of a wire assembly materially increased the cost of the receptacle plug and connection cord and it was decided to ground through the neutral conductor of the feeder. Non-metallic sheathed cable was therefore chosen, because in addition to the above advantages it is a thoroughly good material, answering all safety and installation requirements.

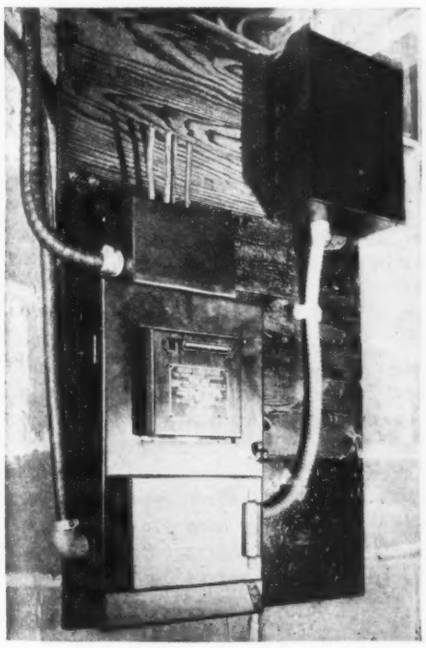
The use of the General Electric Company range receptacle in the kitchen, although actually increasing the cost



Entrance and range switch is of dead-front type



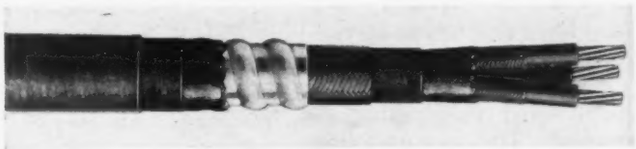
Large receptacle provides for grounding of frame through feeder neutral



Service wires terminate in special channel

Skinning of special cable is readily accomplished

The outer braid may be ringed with a knife, the armor cut with a hacksaw, just as armored cable would be, and then the entire section of armor and outer braid twisted off in one piece.



Cable layers exposed

Three rubber-covered and braided wires are cabled and sealed against moisture by an asbestos base calk. A braid over all three of the conductors is saturated with a special compound. An interlocking galvanized steel tape is then applied. Another treatment of calk protects this armor from moisture.

Labor and material saved

Old-style entrances required many parts and tools to assemble and erect a 60-amp. rigid conduit service. Labor was a considerable item. New armored service-entrance cable cuts to a minimum tools and materials required. Speedy installation is easy.

of the installation, presents advantages that outweigh the added expense. It will eliminate call-backs on the part of the contractor in a great many cases, as it makes him independent of the delivery of the range for the completion of his work. It makes possible the substitution of electric cooking equipment for other forms, with minimum inconvenience to the customer, since the wiring installation can be completed before moving out the old range. It also answers the question of how to terminate a range feeder in the kitchen of a new dwelling when an electric range is not to be installed immediately. In addition, as these installations multiply, it will become increasingly easy for a tenant to move from one house into another without annoyance or tedious delays in getting his electric range connected, as the receptacle essentially places the range in the same category with a cleaner, toaster or other plug-in device. The cord and connection plug will be attached by the company on ranges which it sells. The range frame will be grounded to the neutral of the cord.

In addition to the above items, the standard includes a "service channel," on which Niagara Hudson is standardizing for all single-phase, 30-, 60- and 100-amp. installations. This will be supplied to the contractor for installation, but will be owned by the company. The service wires terminate in the channel and are carried from there to a States Company meter test block of special design in a bakelite base and cover. Test block and meter, which with the service channel form a compact housing for the unmetered wires, are naturally installed by the company. By placing the meter ahead of the main fuses all unmetered wires are kept out of the switch, and it is thus simplified in design and reduced in cost. Since the cabinet will not be sealed, the customer will soon learn that he can service his own fuse equipment and the technique of doing it.

Several violations of the National Electrical Code were encountered in working out the details of the new method. They are as follows:

1. Connection of the meter ahead of the main fuses.
2. The grounding of the range frame to the neutral of the range feeder.
3. The use of a range connection cord with a reduced size neutral conductor.

These violations can all be supported on sound, technical grounds and the underwriters' associations having inspection jurisdiction have given approval.

In general, this wiring method is applicable to single- and two-family dwellings, using a three-conductor No. 2 armored entrance cable for duplex houses. Certain items, however, can be used in farm and apartment house jobs. For instance, the entrance cable, range feeder and range receptacle are applicable to farm jobs, while the range receptacle has a definite advantage in apartment house work, as it supplants the range switch otherwise required by the code.

Present range installation costs in Niagara Hudson territory, using a rigid conduit service and armored cable

Size of Entrance Wires and Range Feeder

	—Length of Entrance—		—Length of Range Feeder—	
	Less Than	Over	Less Than	Over
Wattage of Range	35 Ft.	35 Ft.	35 Ft.	35 Ft.
Not over 8,660 watts	3 No. 6	3 No. 4	3 No. 8	3 No. 6
Over 8,660 watts	3 No. 4	3 No. 2	*3 No. 6	3 No. 4

*Above 12,660 watts use No. 4 minimum.

In determining wattage, use range nameplate rating, which includes 660 watts for appliance receptacle. Table is based on approximately 1.5 per cent regulation for total run of entrance wires and range feeder.

range feeder, vary from $50 in western New York to $65 and $70 in the central and eastern part of the state. These are average figures for a No. 6 service and No. 8 range feeder. It is expected that average costs with the new standard will vary from about $38 to $48, depending on the locality. These figures are substantiated by contractors' estimates already received. It should be noted that while the company's installation price will be based on the materials and method outlined, the contractors installing company-sold ranges naturally will be privileged to use other materials if they find them of equivalent cost and prefer to use them.

Although the method was developed primarily for installation of ranges sold by the company where the existing service must be replaced, contractors and dealers are being urged to use it on their own jobs and to apply it to new house construction as well. Without question additional vendors will enter the field with service-

entrance cable and with a compact combination switch of the type indicated, so that equivalent materials at a reasonable cost will be available to the contractor from his usual supply house. Due to the difficulty of securing distribution of switches and entrance cable throughout the territory in a short time, the company placed the initial order. This stock, however, is being turned over to the electrical wholesalers, and contractors will obtain all supplies direct from their jobber.

It should be noted that this simplification is merely a step in the right direction. Additional economies can be secured without sacrificing safety or adequacy, when certain National Electrical Code requirements are liberalized. Entrance cable and interior feeder costs are susceptible to reduction by use of a bare and reduced size neutral conductor. The cost of grounding the service neutral and the equipment can be reduced by a simplification in method now used in several municipalities. Diversity in the range itself and in the complete residence installation should be recognized, as some inspection authorities are now demanding 100-amp. entrance equipment on an installation of a range of normal wattage, a water heater and the usual lighting and small appliance loads, whereas the demand factor of a fully electrified home is probably in the neighborhood of 0.50.

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READERS' FORUM

Meter Register Ratio Determination Still Raises Discussion

To the Editor of the ELECTRICAL WORLD:

May I be permitted to reply, by way of a mild rejoinder, to the criticisms submitted in a letter under the Readers' Forum of the June 20 issue of the ELECTRICAL WORLD* concerning "Easy Register Ratio Determination(?)"

I stand corrected on the two examples of register ratio determination under discussion, but it will be observed that in both instances the manufacturer has digressed from the usual routine, as witness the statement of my letter for May 2: "I differ with the authors as to the correct register ratio, unless the manufacturer digressed from the usual routine (which, of course, does infrequently occur, but there is always a way of checking this by counting the ratio of the register gears for correct ratio and then seeking our disk K)." In the instance of the Westinghouse meter the correct reduction ratio was 5 instead of $6\frac{1}{4}$.

However, concerning the General Electric meter wherein the authors state, "This meter is not based on the 5-amp., 110-volt constants; a statement to this effect is contained in the article of March 21. The reason for this is that in the three-phase, four-wire installation the voltage rating is given to neutral instead of between lines. The constant for a 5-amp., 110-volt meter of this type is 1 instead of 0.9." The fact that the voltage rating is to neutral has positively nothing to do with the constant. Even though the authors prove their statement by referring to the General Electric bulletin GEB-20, it reveals nothing definite except a digression. The writer has had occasion to work a great deal with General Electric meters of the three-phase, four-wire, 2,200-volt type and in all instances the constant was 0.9. Indeed, even though there are four single-element meters in this particular type of meter, it does not determine the constant as that of 1. In the event of a test, and if the four single elements of either the 1 or 0.9 constant meter were connected in series for this test, the test constant of the former would be 0.25 and of the latter 0.225. The split current element of a $2\frac{1}{2}$-element meter functions in its peculiar fashion so that at unity power factor the one side of the element operates at 60 deg. lagging and the other at 60 deg. leading, the other two current elements being in phase with their respective potentials as the voltage is to neutral, hence the vector sum of four elements is equal to the function of three elements. The writer believes it is superfluous to state that the reason why the constant is 1 instead of 0.9 is due to the particular derivation of the voltage acquired.

Then referring further to the final statement of the authors: "As seen from the foregoing discussion, both the expressions for the determination of ratios are satisfactory; each, however, must be supplemented by additional information concerning the meter. For this reason all the additional information concerning the meters was assembled in tabular form in the March 21 article. In order that the formula given in the letter of May 2, 1931, may be used in the field, either the manufacturer's information bulletin, the meterman's handbook or a similar table must be available or the work is subject to informational error."

Now this brings us to the point of the whole discussion. The article of March 21 is too complicated for practical use, and one must have the table constantly in his possession. The formula given in the letter of May 2 as a substitute needs no supplementary information as decried in the above statement. Albeit, one must watch his step when applying same. After all, where is there a formula that does not constitute some factors calling forth wary thoughtfulness by way of application?

Board of Public Works,
Holland, Mich.

ROY E. BABCOCK,
Electric Meter Department.

*See also Electrical World, May 2, page 825, and March 21, page 539.

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Clearing Substation Buses with Lines in Service

To the Editor of the ELECTRICAL WORLD:

The following error has been observed in the ELECTRICAL WORLD for June 20, 1931; on page 1175 the left-hand column next to the last sentence should read: "To provide complete reliability all breakers are normally closed. To clear buses breakers 1, 2, 4 and 6 are opened, the transformers being fed directly from the incoming lines."

H. H. SPENCER,
Protection Engineer
New England Power Engineering & Service Corporation,
Boston, Mass.

BOOK REVIEWS

Communication Networks

By Ernst A. Guillemin. John Wiley & Sons, New York. 425 pages. Price, $5.

Professor Guillemin of Massachusetts Institute of Technology has in this text provided an approach to the classical theory of the network as it appears principally in communication design and practice. The mathematical artifices of determinants, particular integrals, and determination of constants of integration are developed for their contribution to the solution. The treatment is mathematically interpretive of such practical aspects as transformer circuits and coupled circuits. The Heaviside expansion formula is introduced, along with the Fourier and other periodic functions.

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Radio Frequency Measurements

By E. C. Moullin. Second edition. J. B. Lippincott & Company, Philadelphia. 487 pages, illustrated. Price, $12.50.

This book has been rewritten and enlarged for the purpose of bringing it up to date and enlarging its scope. It is a combination of textbook and laboratory handbook on radio frequency phenomena and measurements. It deals with the electromagnetic field, circuit formulas, vacuum tubes, measurements of frequency, inductance, field intensity, resistance, capacity and antenna characteristics. It is quite complete in theory and technical in its discussion of measurements.

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Life Expectancy of Physical Property

By Edwin B. Kurtz. The Ronald Press Company, New York. 205 pages, numerous charts. Price, $6.

The author has here applied to the life problems of physical property—structures, machinery, equipment, etc.—the principles and methods used by life insurance actuaries in dealing with the problems of human mortality. He thus crystallizes recent advanced thinking upon the problems of depreciation and obsolescence combining the engineering and accounting aspects of the problems involved. The book is liberally illustrated with charts and diagrams. All necessary data are presented in carefully organized tabular form, useful life expectancy, renewals, and other valuable information being included.

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Grundzüge der Zählertechnik

By Dr.-Ing. W. v. Krukowski. Published by Julius Springer, Berlin W 9. 521 pages, 314 illustrations.

Sponsored by the Society of German Electrical Engineers (VDE) this volume was prepared, it is stated, to meet the lack of a suitable textbook and reference manual to prepare candidates for examinations for meter experts. With this definite objective the form of treatment is established. The style of the book is descriptive and readable; mathematical discussion is not avoided, but is confined to essentials. Some desirable features have been incorporated which books on metering commonly ignore, such as clock movements and temperature compensation. In the first 80 pages general principles of direct and alternating-current theory are reviewed. Construction, operation and calibration of various kinds of meters, including those for composite rates, necessarily, get most space. Other subjects are: Correction factors for misconnected polyphase meters, physical definitions, mathematical formulas and tables, extracts from German legal requirements and VDE rules.

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High-Frequency Alternating Currents

By Knox McIlwain and J. G. Brainerd. John Wiley & Sons, Inc., New York. 510 pages, illustrated. Price, $6.

This text for senior and graduate electrical students covers modern aspects of sound transmission and radiation by means of high-frequency currents. It outlines the subject very thoroughly and traces developments from the microphone to the vacuum tube in its several aspects and ends with the general field equations and Maxwell's electromagnetic theory.

Mathematics is used to get quantitative results and illustrative graphs and oscillograms aid in securing clarity and completeness. This book should be useful in many colleges as it fills a gap in textbooks very well. Especially creditable is the treatment of the vacuum tube, its circuits and its controls.

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Interstate Transmission of Electric Power

By Hugh Langdon Elsbree. Harvard University Press, Cambridge, Mass. 212 pages. Price, $2.50.

There is a growing conflict of established state and federal authority with respect to the interstate transactions of the utilities. The author has assembled and interpreted the cases in regulation where sole or joint action by the state commissions has encountered obstacles in attempting to regulate the rates, operations or financing of these interstate electrical enterprises. There are also included cognate cases of gas and pipe lines.

Mr. Elsbree has faith that joint action can be rendered successful, but believes that it will need the aid of Senator Couzens' bill, consequently he admonishes the commissioners' association to moderate its vigorous antipathy to passage of the bill.

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Industrial Organization

By Harry Rubey. Ginn & Company, Boston, Mass., 1931. 308 pages, illustrated by diagrams, forms and tables. Price, $2.80.

Professor Rubey has produced a valuable and readable book for the engineer seeking quickly to acquire an understanding of the basic features of modern business organization. In concise but clear form he sets forth the major outlines of promotion, finance, management, organization, advertising, marketing, purchasing, insurance, personnel, research, accounting, statistics and valuation as these enter industry today. Economic analysis of projects and the study of the case-method with specific problems are included. Engineers and indeed many others have often missed a comprehensive fundamental exposition of business practice in their training and serious reading. This work opens the door toward a well-illuminated understanding of a subject now vitally important in the broader success of the engineer. Excellent bibliographical references are included by chapters.

Men of the Industry

D. E. Karn Heads Michigan Association

D. E. KARN, who was recently elected president of the Michigan Electric Light Association, has been closely identified with the electric light and power industry in that state for fifteen years. He was born on an Indiana farm and attended Purdue University, from which he was graduated in 1915. After a year with the Central Illinois Light Company

he entered the employ of the Consumers Power Company, serving for three years as superintendent of the steam-heating department at Grand Rapids, then going to the rate department of the Hodenpyl-Hardy organization. Later he became assistant to the general manager of the Consumers Power Company. For 2½ years beginning July 1, 1924, he was with the Commonwealth Power Corporation in charge of the securities department. During the past four years he has been district manager of the Consumers Power Company at Kalamazoo, but several months ago was recalled to headquarters at Jackson to take the newly created post of assistant general manager. Mr. Karn has always taken a deep and active interest in the Michigan utility organizations and in the Great Lakes region, as well as civic activities in the various locations where he has worked and lived.

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THOMAS W. MARTIN, president of the Alabama Power Company and of the Commonwealth & Southern Corporation, was awarded the honorary degree of doctor of laws by Cumberland University.

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ROBERT E. POLK has been appointed merchandise sales manager of the Duquesne Light Company. Mr. Polk has been identified with the Pittsburgh utilities since 1918, having previously been associated with the public utility industry in the Middle West. His work has been in the sales field. He is a member of the National Electric Light Association, Engineers' Society of Western Pennsylvania, the American Gas Association and other engineering societies.

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G. K. Miltenberger Assumes Broader Duties

GEORGE K. MILTENBERGER, who recently was appointed general superintendent of the Union Electric Light & Power Company of St. Louis, has been connected with that company and its predecessors continuously since 1916 with the exception of two years spent in military service. In that year he joined the Electric Company of Missouri, which operated power plants in St. Louis County and adjacent territory which have become part of the Union Electric System. Following discharge from military service he became research engineer for the Union Electric, later being advanced to the office of assistant vice-president.

In 1925 the Union Electric interests had secured control of the Mississippi River Power Company, which owns and operates the Keokuk hydro-electric plant, and Mr. Miltenberger was made responsible for the operation of those properties, including the power plant at Keokuk as well as the transmission system to St. Louis and the other territory served with the hydro-electric power. He was given the rank of assistant to the president of the Mississippi River Power Company, a title he still retains. In 1928, when the Union Electric took over the East St. Louis & Suburban Company and affiliated companies, he was also made assistant to the president of the East St. Louis & Suburban Company, in which position he also continues.

As general superintendent he will have supervision of all the properties of the Union Electric Light & Power Company of Missouri as well as those of the Union Electric Light & Power Company of Illinois.

H. W. Young New Vice-President of Minneapolis Company

H. W. YOUNG, who has been elected vice-president in charge of sales of the Northern States Power Company, has a broad background of experience in the public utility field in this country, in Europe and in the Orient. His first employment, after graduation from the Massachusetts Institute of Technology, was in the engineering department of the

American Telephone & Telegraph Company, where he was engaged in making development plans for most of the larger cities in the South. Later he received a government appointment to the Department of Coast and Geodetic Survey in Washington and from there he was transferred to the office of this department in Manila, P. I. As city electrician in Manila he received special appointment by the Philippine government to make an investigation of electric rates, ordinances and street railway matters in various cities throughout the world, especially in the Orient, in which capacity some eight months were spent in travel and study of these matters. A year later he was again appointed by the government to make a special investigation of various gas companies, which appointment necessitated a second trip around the world.

At the conclusion of this investigation he received an offer from the Toronto Hydro-Electric System about the time it was getting under way, which he accepted. Before leaving Toronto he became assistant sales manager in charge of power sales and a number of other

selling activities. Mr. Young joined H. M. Byllesby & Company in Chicago later and was first located with the Minneapolis General Electric Company in Minneapolis as a power sales engineer. He has been successively manager of power sales, sales manager of the Minneapolis General Electric Company and general sales manager of the Northern States Power Company and subsidiaries.

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JAMES A. POWELL, vice-president and assistant chief engineer of W. S. Barstow & Company, Inc., engineering and construction unit of the Associated Gas & Electric System, has been honored with the degree of doctor of science by North Carolina State College, Raleigh, N. C. The degree was awarded in recognition of Mr. Powell's outstanding accomplishments in the field of mathematical engineering.

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MARCY L. SPERRY has been appointed vice-president of the Fall River (Mass.) Gas Works Company, succeeding C. C. Curtis, who has been transferred to the Puget Sound Power & Light Company, Seattle, Wash. Mr. Sperry has been associated for many years with the Stone & Webster Service Corporation in executive positions in electric utilities in Ponce, P. R.; Minneapolis, Minn., and Savannah, Ga.

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H. M. PARSONS has resigned his position as vice-president in charge of the electrical department of Landers, Frary & Clark to become a sales executive with the Walker & Pratt Manufacturing Company in Boston, Mass., maker of Crawford electric ranges and water heaters. His connection with this company is effective as of August 1. Mr. Parsons has long been identified with the electrical industry, serving for many years as general manager and consulting engineer for the C. D. Parker Syndicate of Boston, Mass. He entered the employ of Landers, Frary & Clark in 1925 as assistant to the president, assuming the vice-presidency a year or two later.

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C. F. HERINGTON, contracting engineer for the past nine years in charge of sales, engineering and erection of complete pulverized coal plants for Heyl & Patterson, Inc., Pittsburgh, Pa., has opened offices in New York City. Mr. Herington, who has been engaged in general engineering work for more than 25 years and who has specialized in pulverized coal plants for the past fifteen years, will continue to design, furnish and erect pulverized coal plants. He will also design, furnish and erect coal-handling equipment for power stations as well as pneumatic transport systems for conveying pulverized coal and other mechanical equipment.

OBITUARY

T. P. Gaylord

TRUMAN P. GAYLORD, vice-president of the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., died suddenly July 5 in Shelby, Mich., while on a visit over the holiday weekend. He was 60 years of age. Mr. Gaylord became identified with the Westinghouse Electric & Manufacturing Company in 1899 and in 1902 he was appointed district manager of the Chicago office. Twelve years later he assumed the duties of acting vice-president and in the spring of 1929 he was elected to the vice-presidency.

Mr. Gaylord was born in the town

where he died. He attended the Allen Academy of Chicago, the University of Michigan, from which he was graduated with the degree of electrical engineer, and Armour Institute of Technology, from which he secured a degree in 1895. The Chicago World's Fair was starting when Mr. Gaylord began to work for the fair company as engineer of the underground construction and he continued in that capacity from 1892 to 1893. At the close of the World's Fair Mr. Gaylord became assistant professor of electrical engineering at the Armour Institute, serving there from 1893 to 1898. He was associated with the Commonwealth Edison Company for a year previous to entering the employ of the Westinghouse Electric & Manufacturing Company.

Mr. Gaylord was elected to directorship in the Pittsburgh Chamber of Commerce in 1926, and in 1927 was chosen president of that organization, an office he held until 1929. He is a member of the American Institute of Electrical Engineers and of the Chamber of Commerce of the United States.

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FROST L. BENHAM, manager of the Upper Verde Public Utilities Company, Jerome, Ariz., died in that city, June 16, as the result of injuries received in an automobile accident. He was a director of the Arizona Utilities Association and served as general chairman at the annual convention of that association held last April.

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T. H. U. ALDRIDGE, vice-president and general manager of the Shanghai Power Company, Shanghai, China, died suddenly, May 10. A native of London, England, he established residence in China in 1901, when he was appointed municipal electrical engineer to the International Municipal Council of Shanghai. As engineer-in-chief and manager of the municipal electricity department Mr. Aldridge was directly responsible to the electricity committee for both technical and commercial direction of the undertaking as well as matters involving finance.

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FRANCIS J. NANKIVELL, electrical and mechanical engineer, died July 6, of heart disease, in Shokan, N. Y. Mr. Nankivell was 38 years of age. He was born in Yokohama, Japan, and received his engineering training at Cornell University. In his senior year he taught in the department of engineering. In the course of his career he had been identified with several electric light and power companies in this country and he also engaged in construction work for three years in South America.

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SETH A. LEONARD, president and treasurer of the Leonard Electric Manufacturing Company, Cleveland, Ohio, died at his home in that city June 27 as the result of a heart attack. Mr. Leonard was born in Ashtabula, Ohio, in 1854 and spent his boyhood in Philadelphia. In 1891 he removed to Cleveland, entering the employ of the W. D. Graves Company, manufacturer of arc lamps and other electrical equipment. He served this company until 1902, when, with Charles Bundy, he organized the Leonard-Bundy Electric Company, manufacturing switchboards and auxiliary apparatus. From this humble beginning Mr. Leonard built the company he headed at the time of his death. In 1913 Mr. Bundy left the company and four years later the company name was changed to the Leonard Electric Manufacturing Company.

Financial and Statistical News

EARLY in the week the German crisis had but a slight reflection in the New York market, where a rather unsettled condition prevailed, recessions being slight. However, even such leaders as Electric Bond & Share, Cities Service, American & Foreign Power warrants and American Superpower showed some losses.

——TRADING BECAME UNUSUALLY DULL MID-WEEK and narrow price fluctuations characterized the market. The majority of changes were downward. Although the utilities followed the general trend, yielding some ground, losses were negligible. Index of 37 representative utility companies compiled by the ELECTRICAL WORLD shows that this group remained practically unchanged.

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Change Investment Laws for Savings Banks

SEVERAL CHANGES OF IMPORTANCE were announced July 1 by the National Association of Mutual Savings Banks in the investment laws of eleven mutual savings bank states. A number of these changes have a bearing on investment in public utility securities. The changes affect principally Connecticut, New Hampshire, Maine, Vermont, New York, Massachusetts, Pennsylvania and New Jersey.

In regard to proportion of deposits to be invested in one company's bonds New Jersey provides that "not more than 20 per cent of total deposits may be invested in bonds issued, guaranteed, or assumed by operating public utility company, not less than 85 per cent of gross operating revenues of which is, at time of such investment, derived from operation of one or more of following utilities, viz.: artificial gas, the sale of natural gas or of a mixture of natural and artificial gas to consumers through a distribution system owned, or leased by it, electric power or light, water . . . or which such company has otherwise covenanted or agreed to pay."

Several similar clauses are added to apply to savings banks in other states also and in some cases defining rather than changing existing clauses.

Other provisions specify a certain standard of earnings required before the bonds are eligible for investment in specific states. One section specifies, for example, that "such corporation must have earned and received average net income in three fiscal years, or three nearer periods of one year each, next preceding investment, not less than twice current annual interest on all debt secured by mortgage under which bonds in question are issued and all prior liens; provided that such corporation has earned and received net income in last fiscal year, or nearer period of twelve months next preceding investment, not less than twice annual interest for such period on all indebtedness secured by all mortgages of equal rank to that under which bonds in question are issued, and on all prior liens, and that in each of two preceding fiscal years or twelve-month periods, not less than twice annual interest for each such period on all indebtedness of equal rank with bonds in question, and on all prior liens outstanding at such period, unless hereinafter otherwise specified, and shall not have defaulted on any obligations during any one of said periods referred to."

May Output Under Last Year's

OUTPUT IN MAY of public utility power plants, including other utilities as well as electric light and power, was 7,623,-104,000 kw.-hr., the U. S. Geological Survey reports. Comparison with April is afforded by the following production figures, in millions of kilowatt-hours:

	April	May
By water power	3,122	3,115
By fuels	4,520	4,508
Total	7,642	7,623
Change from 1930, per cent	—5	—5

The average daily production in May was 3.5 per cent less than in April. This is about the normal seasonal change. The usual decrease in average daily consumption from January to May is about 4.4 per cent; this year the reduction was 4.1 per cent.

Output from water power, 41 per cent of the total in both months, probably was at a maximum for the year in April; it has continuously fallen short of last year's production in corresponding months.

New England was the only geographical region reporting an increase, 2 per cent, over 1930, while the Middle Atlantic and East North Central industrial areas show declines of 8 per cent.

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Consumers Power Slashes Costs of Operation

BY "PULLING in the belt" on operating costs Consumers Power Company has been able to show a 4.01 per cent rise in gross income in the face of a 2.7 per cent drop in gross earnings.

Operating expenses were whittled to the extent of almost 12 per cent. Taxes, which, incidentally, amounted to nearly one-fifth of gross income, increased slightly. Net income after fixed charges was up 2.6 per cent, but a 20 per cent advance in retirement reserve brought the balance available for common stock down 2.6 per cent, to $8,073,967. This reduction in common stock earnings is borne entirely by the Commonwealth & Southern Corporation, sole owner of the common stock.

Industrial depression had the effect of cutting down kilowatt-hour sales by 11 per cent, to 867,090,897. The number of electric meters, however, increased from 296,036 to 307,686.

Capital structure changes during the year bettered the set-up by retiring 5 per cent bonds and replacing them with 4½ per cent bonds. A substantial block of preferred stock also was sold to customers.

Total assets of the system as of December last amounted to $218,376,-628, of which $187,293,676 was invested in property, plant and equipment.

An aggressive policy of expansion was carried out during the year. There was an increase of 16.86 per cent in the sales of electricity to residential consumers, whose average use per annum increased from 517 kw.-hr. in 1929 to 578 kw.-hr. in 1930. New power and lighting business to a total of 46,000 hp. was obtained. It is significant that 76 private power plants operated by industrial concerns were either supplemented by or shut down in favor of Consumers Power service during the year.

Taxes Large Factor in Utility Rates

WHAT the remission of taxes would do to utility rates is shown in a study recently completed by the National Electric Light Association. The study shows that gross revenue from domestic service rose about 650 per cent in the past quarter century; taxes went up more than ten times as fast. The report, in part, follows:

Suppose governmental authorities should conclude that because of the importance of a low electric rate to the domestic consumer all electric light and power companies should be relieved of all taxation and directed to apply all money now being paid in taxes to the reduction of rates for domestic service. The average domestic rate of the nation, which is now approximately 6 cents per kilowatt-hour, would thereby be reduced to approximately 4 cents per kilowatt-hour.

Such is the present advantage granted the municipal power systems through tax exemption, for the municipal plant, generally speaking, passes all its tax exemption advantage on to the voting domestic consumer. This tax exemption is far from a negligible factor, as is obvious from the ratio of 4 to 6 cents.

In the year 1902, according to a table published in the report, the taxes paid by electric light and power companies totaled $2,654,885, representing 3.4 cents out of every dollar of consumer revenue and 8.7 cents out of every dollar of investor's income.

By 1922 the companies' total taxes had increased to $73,128,440, or 8.4 cents of every consumer revenue dollar and 18.6 cents of every dollar of investor's income. The taxes paid by companies in 1929—the last year for which figures are available — totaled $187,500,000, which represented 9.7 cents out of every dollar of consumer revenue and 19.6 cents out of every dollar of investor's income.

The ratio of taxes paid to gross revenue from domestic service grew from 4 per cent in 1912 to 33 per cent in 1929.

"Since taxes are raised to bear the cost of government," comments the bulletin, "the granting of an exemption to one party accomplishes no reduction whatsoever in the total taxes to be raised, but merely transfers more of the tax burden to other private enterprise to stultify its development and reduce the opportunities for employment. This taxing of electric light and power companies and the exemption, except to a very limited degree, of municipal power plants is one of the unfair and unsound results of placing government into competition with business."

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Weekly Output Rises

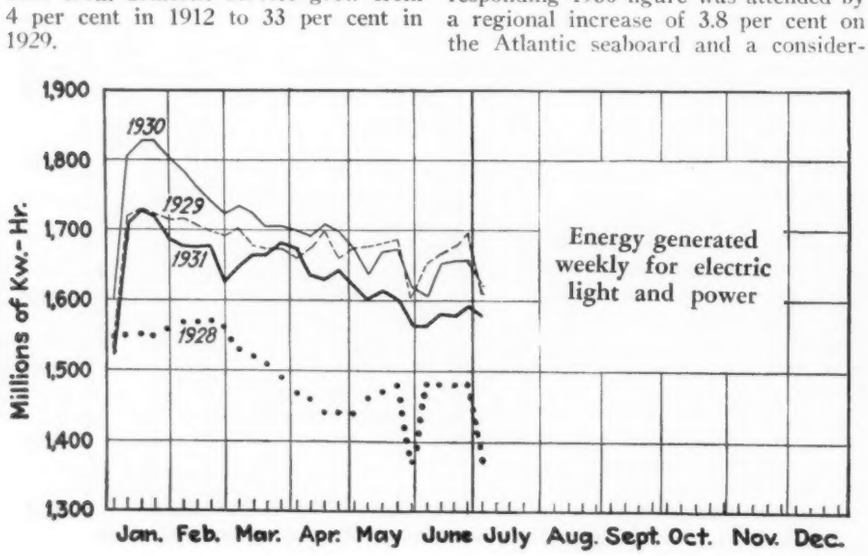
OUTPUT OF ELECTRIC light and power companies in the United States, as estimated by the statistical research department of the National Electric Light Association, is shown in the accompanying chart. For recent weeks and correspondingly in preceding years the energy generated was:

Week Ended	Millions of Kw.-Hr. 1931	1930	1929	1928
June 13	1,581	1,663	1,675	1,480
June 20	1,579	1,656	1,678	1,480
June 27	1,593	1,657	1,698	1,480
July 4	1,576	1,581	1,611	1,366
July 11	1,665	1,650	1,717	1,521

The very moderate reduction in the week of July 4 from the preceding week's output seems to show that little industrial energy is normally being consumed on Saturdays, so that even a nation-wide holiday does not greatly affect the week's total if it falls on that day. In 1929 the influence of the holiday was much more marked.

In the holiday week the close approach of the country-wide average to the corresponding 1930 figure was attended by a regional increase of 3.8 per cent on the Atlantic seaboard and a considerable improvement in the central industrial area.

Last week for the first time the output exceeded the 1930 equivalent. In the preceding three weeks it had fallen short successively by 4.6, 3.9 and 0.3 per cent.



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New Capital Issues

DURING THE WEEK ENDED July 16 two Wisconsin utility companies floated new offerings. The Wisconsin Public Service Corporation issued 4 per cent gold notes to the amount of $2,500,000, the price being 99½ and interest, yielding more than 4.50 per cent. Wisconsin Valley Electric Company issued 4½ per cent gold notes at 99½ and interest, amounting to $4,000,000. Both these properties are subsidiaries of the Standard Gas & Electric Company. Proceeds of these issues will be used to retire current indebtedness and to reimburse the treasuries of the companies in part for expenditures for additions and extensions made and to be made.

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NEWS BRIEFS

Directors of the Middle West Utilities Company voted July 2 to extend common stock purchase warrants, series A, to December 31, 1932, and to extend common stock purchase warrants, series B, to December 30, 1933.

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Central West Public Service Company has added to its board of directors Fred S. Burroughs, a director and executive vice-president of the Chase Harris, Forbes Corporation.

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Union Electric Light & Power Company of Missouri has filed an application with the Missouri Public Service Commission to buy 375,000 shares of stock of Union Electric Light & Power Company of Illinois for $20 a share, paying cash. To provide for the purchase, the company seeks permission to sell 300,000 shares of its own common stock at $25 a share to the North American Edison Company.

•

Expenditures by the municipal Light and Power Department of Pasadena, Calif., for 1931-32 are estimated at $572,550. Of this amount production expenditures are estimated at $204,000, distribution expenditures at $179,550, commercial expenditures $86,625 and general expenditures $102,375. The Municipal Water Department expenditures are estimated at $389,500, which includes $30,000 at the source of water supply, $146,400 for water pumping, $4,500 for purification, $57,000 for distribution, $55,000 for commercial expenses and $96,600 for general expenses.

Industry Shows Normal Change

JUNE industrial activity during the past eight years, which is as far back as these records go, has without exception fallen short of that in May. Measured by energy consumption in industrial plants as reported to the ELECTRICAL WORLD, the average change in the index has been 5.0 points, although it has ranged from 1.7 to 8.2. The change this year from 109.8 in May to 104.8 in June may therefore be ascribed entirely to the usual seasonal changes in the several industries.

Contrast with the winter minimum shows more favorable conditions; the increase of 7.3 per cent exceeds that in any of the past half-dozen years with a single exception. And that exception was not, as might be imagined, in 1929. It was in 1927 and the increase was 10.8 per cent. In 1929 the increase was only 6.1 per cent. In 1930 the June figure fell slightly below that for the lowest month of the preceding winter; in 1926 it fell 3.5 per cent below.

At the same time the level continues abnormally low. The June index this year is 9.3 per cent under that of 1930, and 22.6 per cent lower than in 1929.

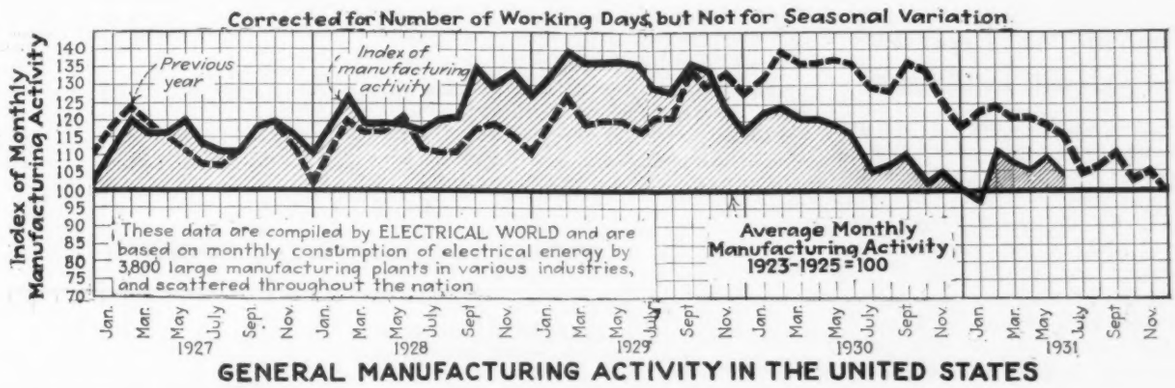
The way the gains and losses are distributed among the industry groups is worth studying. The food products industry is climbing to a summer peak second only to that of 1930; iron and steel fabrication is up 8.3 per cent from May, and a trifle above last June's level; leather gained nearly 5 per cent; textiles are headed upward from the winter's extreme depression; though June was 3.1 per cent below May, it was 5.2 per cent above June of 1930; rubber manufacture, against a May-to-June decline of 22.5 per cent last year, fell 1 per cent this year and now stands 15.5 per cent higher than it stood a year ago.

In contrast, there were declines in branches connected with building (except iron and steel), paper, metal working and most of all in the automobile industry, which stands 20.5 per cent lower than in May and 30.5 per cent lower than in last year's June.

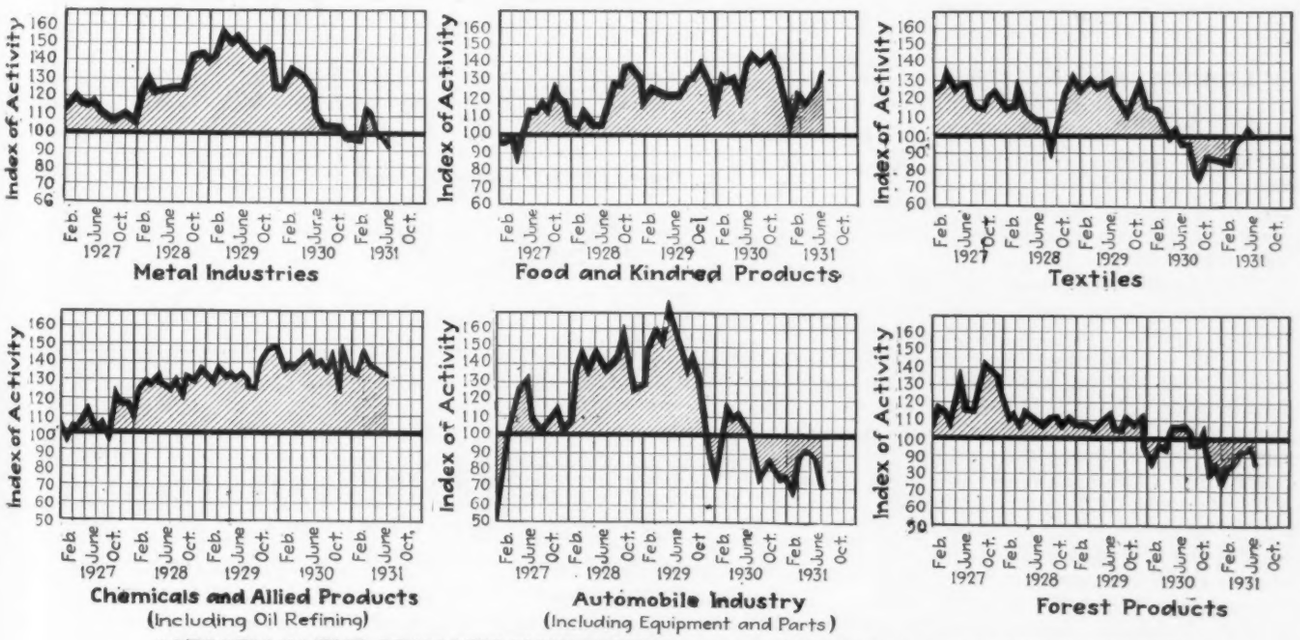
Index of Manufacturing Activity

Base: Average Month 1923-25

Industrial Group	June, 1931	May, 1931	April, 1931	March, 1931	June, 1930
All industry	**104.8**	**109.8**	**106.4**	**108.2**	**115.5**
Automobiles (including parts and accessories)	71.3	89.7	90.8	94.1	102.9
Chemical products (including oil refining)	132.7	133.8	137.4	139.3	138.6
Food products	136.2	126.8	122.0	116.8	145.4
Iron and steel	115.7	106.6	108.1	119.4	115.2
Metal working	78.6	94.0	94.6	103.5	106.8
Leather products	85.4	81.0	83.9	71.2	96.8
Forest products	86.3	97.2	91.5	93.2	107.3
Paper and pulp	112.4	135.1	109.6	123.0	137.5
Rubber products	121.0	122.3	109.0	109.6	104.8
Shipbuilding	84.8	89.7	92.5	98.3	111.8
Stone, clay and glass	118.7	132.0	116.5	105.1	136.5
Textiles	100.5	103.7	100.0	97.3	95.3


Corrected for Number of Working Days, but Not for Seasonal Variation
Index of Monthly Manufacturing Activity
Previous year
Index of manufacturing activity
These data are compiled by ELECTRICAL WORLD and are based on monthly consumption of electrical energy by 3,800 large manufacturing plants in various industries, and scattered throughout the nation
Average Monthly Manufacturing Activity 1923-1925=100
1927
1928
1929
1930
1931

GENERAL MANUFACTURING ACTIVITY IN THE UNITED STATES



ACTIVITY IN THE PRIMARY MANUFACTURING INDUSTRIES OF THE UNITED STATES

Business News and Markets

Westinghouse Gets Equipment Orders

ANNOUNCEMENT HAS BEEN MADE by the Westinghouse Electric & Manufacturing Company that a 25,000-kva. synchronous condenser with automatic control switching equipment has been ordered by Puget Sound Power & Light Company. It will be manufactured at the East Pittsburgh Works. The Westinghouse company also reports an order for fifteen transformers to cost $70,000 from the Management & Engineering Corporation of Chicago. The order is for eight 2,500-kva. and seven 1,667-kva. transformers. They will be used to increase the capacity of the Indianapolis Power & Light Company's 33,000-volt load.

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Wonham, Inc., Represents Jeffery-Dewitt Insulator

ANNOUNCEMENT IS MADE by the Jeffery-Dewitt Insulator Company that all foreign sales except in Canada, Cuba and Mexico will be handled by Wonham, Inc., 44 Whitehall Street, New York, and 68-72 Windsor House, Victoria Street, London, England. Wonham, Inc., has handled all export matters on the Punjab contract in India, in connection with which more than 80,000 insulators have already been shipped.

▼

London, 422 Kw.-Hr. per Capita

INCREASED ENERGY CONSUMPTION and reductions in rates are not confined to the United States. Reports from abroad show changes resembling those on this side of the Atlantic.

The London (England) and Home Counties electricity district has made public a report for the year ended March 31, 1930. Production, 2,516,852,000 kw.-hr., was 15.7 per cent greater than in the year before and 33.8 per cent more than in 1927-28. Meanwhile prices are 13 per cent lower than before the war: 2.18d (4.36 cents) per kw.-hr. in 1913-14; 1.89d (3.78 cents) in 1929-30.

The consumption is equivalent to 308 kw.-hr. annually per capita of population served, or, if account be taken of current used by railroad and trolley companies, 422 kw.-hr. Based on the mean of the 1,643,021 kw. capacity at the end of the year and 1,456,444 kw. at the beginning the capacity factor comes out 18.5 per cent. This low factor may explain the comparatively high average price for the energy.

The gross surplus on general working of all the undertakings concerned was £8,702,678 ($42,400,000), an increase of £697,617 ($3,390,000) over the previous year.

General Electric Gets Meter Order

THE METER DEPARTMENT of the General Electric plant at Lynn, Mass., has received an order for meters from a New York concern involving more than $1,000,000. A hundred men have been called back to work and more will be added next month.

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European Crisis Depresses Copper Prices

UNCERTAINTY over the German financial crisis had a depressing influence on virtually all commodity markets. In non-ferrous metals business was just a little better than in the preceding week from a tonnage standpoint, though the total quantity moved was far below what might be considered normal. Lead and zinc prices were well maintained, but copper and tin sold at lower levels. The renewal of the foreign zinc cartel was accepted as a favorable development and was followed by higher zinc prices in London. The copper statistics for June, just released, were about in line with expectations.

Though copper prices actually moved within narrow limits during the week, the trend again was downward. During

	July 8, 1931 Cents per Pound	July 15, 1931 Cents per Pound
Copper, electrolytic	8	7⅞
Lead, Am. S. & R. price	4.40	4.40
Antimony	6.95	6.85
Nickel, ingot	35	35
Zinc, spot	4.25	4.25
Tin, Straits	25.30	24–24⅛
Aluminum, 99 per cent.	23.30	23.30

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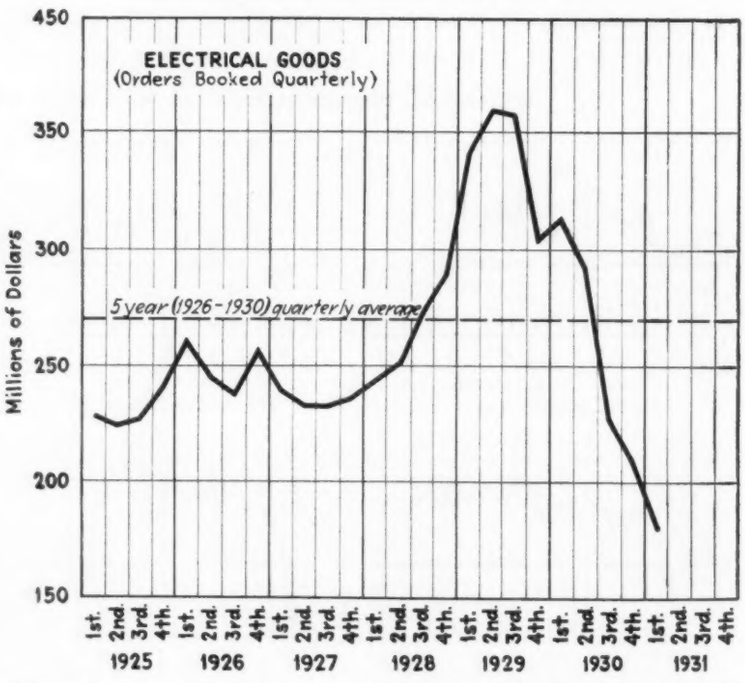
ORDERS FOR ELECTRICAL GOODS



New orders booked during the first quarter of 1931, as reported to the Bureau of the Census by 84 manufacturers of electrical goods, were $181,265,102, as compared with $208,935,443 for the fourth quarter of 1930 and $314,329,372 for the first quarter of 1930.

the first three days of the week moderate tonnages were sold at prices a little above and also a little below the 8-cent delivered Connecticut basis, but the bulk of the tonnage moved was disposed of at 8 cents.

Foreign demand naturally was extremely slow in the last week, as the German crisis overshadowed all other developments as a market factor. There was some apprehension here about what steps producers might take in financing shipments to Germany.

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Changes in Westinghouse Personnel

THE FOLLOWING CHANGES in the merchandising department of Westinghouse Electric & Manufacturing Company were announced as of July 1:

C. A. Meier, formerly merchandising manager of the Southwestern district, is transferred to the Pacific Coast as regional sales manager with headquarters in San Francisco; George Baily, formerly Pacific Coast merchandising manager, is transferred to Mansfield in the capacity of assistant to sales manager; N. E. Harvey is appointed merchandising manager of the Southwestern district with headquarters in St. Louis; R. L. DuVal, formerly large appliance sales manager, Mansfield, is appointed merchandising manager of the Middle Atlantic district with headquarters at Philadelphia; Reese Mills, formerly assistant director of merchandise, is appointed range and water heater sales manager and in addition will supervise the sale of farm lighting and water systems with headquarters at Mansfield; H. G. Kobick, formerly assistant director of merchandise, is appointed washing machine sales manager with headquarters at Mansfield.

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Electrical Exports Drop Almost One-third

SHOWING THE EFFECT of depreciated purchasing power abroad, exports of electrical equipment for the five months ended May 31 were $42,216,068, against $60,798,865 for the first five months of 1930, a drop of 30.6 per cent. The total for May was down 27.2 per cent from $12,170,252 to $8,861,138.

TRADE BRIEFS

Sharples Specialty Company announces the appointment of W. L. Marston as sales manager with headquarters in Philadelphia.

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Signal Electric Manufacturing Company, Menominee, Mich., appointed R. C. McNeely sales and advertising manager, succeeding W. E. Hopper, who resigned to enter the manufacturers' agency business at Atlanta, Ga.

•

A. D. Cameron has been appointed manager of the Holophane Company, Inc., New York City.

•

Link Belt Company declared a quarterly dividend of 50 cents on common stock, against 60 cents paid previously.

•

Ohio Brass Company declared a quarterly dividend of 50 cents on class A and class B stock against $1.25 paid previously.

•

Directors of the General Electric Company, Ltd., Great Britain, have declared a dividend on common of 10 per cent, less tax, for the year ended March 31, against 10 per cent plus a bonus of 4 per cent a year ago.

Exports of Electrical Equipment (Preliminary)

Article	May 1930	May 1931
Generators:		
Direct current—		
Under 500 kw	98,341	16,643
500 kw. and over	2,155	.....
Alternating current—		
Under 2,000 kv.-amp.	68,798	9,666
2,000 kv.-amp. and over	39,500	335,718
Steam turbo-generator sets	31,797	626
Accessories and parts for generators	62,554	59,527
Arc-welding sets	51,009	51,290
Self-contained lighting outfits	37,201	32,711
Batteries:		
6-volt storage batteries	148,465	128,820
Other storage batteries	87,607	63,681
No. 6 dry cell batteries	87,331	88,009
Flashlight batteries	350,284	208,983
Radio B and C batteries (dry)	55,652	42,552
Other dry and wet cell primary batteries	22,557	13,411
Transforming or converting apparatus:		
Power transformers, 500 kv.-amp. and over	460,550	12,871
Distribution transformers, less than 500 kv.-amp.	252,970	58,003
Instrument transformers	22,568	10,606
Other transformers	102,133	43,152
Complete battery chargers under 15 amp.	18,591	3,150
Double current and motor generators, dynamotors, synchronous, and other converters	87,564	87,912
Transmission and distribution apparatus:		
Switchboard panels, except telephone	146,193	47,222
Power switches and circuit breakers over 10 amp.	288,814	72,615
Fuses	29,108	16,976
Watt-hour and other measuring meters	61,729	70,332
Electrical indicating instruments	100,993	57,683
Electrical recording instruments	49,896	32,424
Other electrical testing apparatus	72,427	64,412
Lightning arresters, choke coils, reactors, and parts	73,265	51,016
Motors, starters, and controllers:		
Motors, ¾ hp. and under	221,365	189,140
Motors, over ¾ and under 1 hp.	52,652	37,685
Stationary motors—		
1 to 200 hp.	342,474	123,146
Over 200 hp.	72,090	20,843
Railway motors	7,270	15,240
Electric locomotives—		
Railway	.....	.....
Mining and industrial	129,539	39,953
Station and warehouse electric motor trucks	20,021	54,163
Starting and controlling equipment—		
For industrial motors	172,559	120,829
For electric railway and vehicle motors	11,622	16,010
Portable electric tools	85,003	55,042
Accessories and parts for motors	249,630	128,404
Electric refrigerators and parts:		
Household	1,090,048	1,001,266
Commercial up to 1 ton	299,357	331,806
Parts for electric refrigerators	.....	575,851
Electric appliances:		
Electric fans	147,631	51,149
Electromechanical health exercisers	17,320	2,536
Electric incandescent light bulbs—		
For automobiles, flashlights and Christmas trees	18,976	16,254
Other metal filament	77,811	37,818
Other electric lamp bulbs	13,069	7,417
Flashlight cases	136,668	42,894
Searchlights and floodlights	84,132	16,363
Electric household washing machines	234,632	124,492
Electric domestic vacuum cleaners	189,924	136,610
Other domestic motor-driven devices, except tools	58,708	51,667
Electric flatirons	26,894	15,777
Electric cooking ranges	30,564	29,724
Other domestic, heating and cooking devices	81,641	52,712
Industrial electric furnaces, ovens, and other heating devices	111,419	59,947
Therapeutic and X-ray apparatus	136,627	115,856
Signal and communication devices:		
Radio apparatus—		
Transmitting sets, tubes, and parts	59,071	65,113
Receiving sets	725,960	1,170,940
Radio receiving tubes	233,144	159,026
Receiving-set components	223,302	254,223
Loudspeakers	121,774	92,299
Other receiving-set accessories	85,468	42,486
Telegraph apparatus	81,999	23,709
Telephone apparatus—		
Telephone instruments	63,909	34,259
Telephone switchboards	61,918	14,354
Other telephone equipment	393,221	133,463
Bells, buzzers, annunciators, and alarms	32,065	23,651
Other electric apparatus:		
Spark plugs	122,457	145,410
Other starting, lighting, and ignition equipment	179,294	77,015
Insulating material	113,769	31,101
Metal conduit, outlet, and switch boxes	104,135	55,141
Sockets, outlets, fuse blocks and lighting switches	167,752	120,887
Electric interior lighting fixtures	167,063	99,155
Electric street lighting fixtures	34,533	20,748
Other wiring supplies and line material	122,564	90,674
Other electrical apparatus, n.e.s.	853,842	384,963
Rubber and friction tape	40,899	25,033
Globes and shades for lighting fixtures	53,206	40,213
Glass electric insulators	31,877	6,480
Electrical porcelain:		
For less than 6,600 volts	38,848	25,155
For 6,600 volts and over	73,704	47,152
Carbons and electrodes:		
Electrodes for electric furnaces	244,637	106,800
Other carbon products	74,667	59,292
Insulated iron or steel wire and cable	14,229	10,460
Copper, bare wire	215,043	139,769
Insulated copper wire and cable:		
Rubber-covered wire	65,966	31,163
Weatherproof wire	46,133	29,283
Telephone cable	35,428	12,917
Other insulated copper wire	258,677	114,206
Nickel-chrome electric resistance wire	.....	23,993
Totals	$12,170,252	$8,861,138
Five months ended May 31	$60,798,965	$42,216,068

Market Conditions

SOME more encouraging signs of improvement are evidenced in the equipment markets this week in most sections, especially in the Pacific and Atlantic Coast areas. Reduced prices appear to have induced buying, especially by central stations and for railway electrification.

——NEW ENGLAND ALSO SEEMS TO BE SHOWING EVIDENCES of an increased buying movement in certain lines. The improvement program in the textile industry is creating some business.

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PACIFIC COAST

—ELECTRICAL BUSINESS *is comparatively undistinguished by any outstanding orders, but volume is considered fair, and wide distribution, both of business and of lines, is considered encouraging, although new business for the week is almost non-existent.*

Indicated power business prospects were greatly encouraged by recent affirmation that the remaining units, totaling $15,000,000, of the Herndon steam plant, near Fresno, would be carried out as soon as practicable, one unit, to cost $5,000,000, having already been completed. Other power prospects include 600-amp., 37,000-volt circuit breakers for Los Angeles, $2,000 worth of poles and crossarms for Glendale, 4 miles of No. 000 round trolley wire for San Francisco and a $1,000,000 bond issue on the November ballot, whereby San Francisco hopes to complete a power house in the Hetch Hetchy district.

United States government business comprises varied equipment, such as fixtures for the Letterman Hospital, which is being remodeled throughout with new fixtures and individual radio. Other material covers amplifier parts and machine parts for various California and Nevada plants such as San Diego and Hawthorne, two $32,000 awards covering beacons and airway lighting equipment for two legs of the San Diego-El Paso system, these covering Phoenix and Winslow, Ariz., and an electric train for San Diego. June building permits show an increase around the Bay area in San Francisco, encouraging features including the resumption of apartment house building, with considerable electric range interest, and much school construction of a smaller kind, principally due to vacation opportunity for miscellaneous work. Industrial business includes a General Electric motor-generator set valued at $4,000 for a Bay area building paper plant and a $16,000 Westinghouse motor and control installation for a lumber plant in the Portland area.

Specifications have been issued by the Weyerhaeuser Timber Company and bids will be opened July 21 for in excess of $20,000 worth of switchboard and motor control apparatus for a pulp and paper mill in Longview. Motors, as heretofore announced, were bought from Westinghouse. The city of Seattle lighting department will call bids within a week for $100,000 worth of weatherproof copper wire. Sales reported last week included $15,000 worth of Square D dead-front distribution power panels to be installed in the $3,200,000 Ford Motor Company's Seattle assembly plant; about $7,000 in transformers to a pulp and paper mill, including three 333's; one 25-kw. motor-generator set, 35 motors from 50 hp. down to lumber mills, allied woodworking plants and miscellaneous sources, twenty machines from 25 hp. down to dealers and irrigation districts and 30 machines from 100 hp. down, including a number of 60's and 75's, to mills, small industrials and dealers. Immediate construction of a $100,000 mineral conversion plant and a $150,000 acid plant at Anchorage, Alaska, is announced by W. E. O'Malley and associates. A street-lighting installation in Seattle costing around $10,000 has been ordered.

CONSTRUCTION PROJECTS

Fresno Precooling & Cold Storage Company, Fresno, Calif., plans precooling and refrigerating plant to cost $100,000. Long Beach and Glendale, Calif., have authorized ornamental lighting systems. Port Commission, Oakland, Calif., plans storage and distributing plant at Harbor Terminal, estimated to cost $180,000. Pasadena *Post*, Pasadena, Calif., plans newspaper printing and publishing plant to cost $100,000. Department of Public Works, San Francisco, Calif., will soon take bids for lighting system at Mills Field municipal airport. Colonel G. J. Griffith Estate, Los Angeles, Calif., is having plans drawn for an observatory in Griffith Park to cost $750,000. Bureau of Reclamation, Nyssa, Ore., will receive bids until July 27 for construction of Thief Valley Dam, Baker project, Ore. Department of Public Works, Boise, Idaho, plans addition to state asylum at Blackfoot, estimated to cost $250,000.

SOUTHWEST

—AS HAS BEEN MENTIONED BEFORE, *the bright spot in electrical business continues to be fans, with electrical refrigerators a good second.*

A tour of southern Illinois coal fields found several of the largest mines shut down, but cleaning up ready for start in the early fall. While buying very carefully, they are replacing defective electrical equipment and anticipate a good demand early in September. The only order worth mentioning was for thirteen voltage-feeder regulators for one of the power companies to cost $14,000.

CONSTRUCTION PROJECTS

Board of Water Commissioners, St. Louis, Mo., will carry out expansion and improvement program in municipal waterworks to cost $650,000, including installation of power equipment. International Harvester Company, Chicago, Ill., has filed plans for addition to branch plant at Topeka, Kan. J. I. Case Company, Racine, Wis., has revised plans for addition to branch agricultural equipment plant at Oklahoma City, Okla., to cost $65,000. Paragould, Ark., will carry out expansion program at municipal airport, including hangars and other field units, to cost over $70,000.

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SOUTHEAST

—THE VOLUME OF ORDERS *and inquiries in the Southeast is reported to have been well sustained by a large order from a new industry, while central-station business consisted of a large number of small orders, principally for electrical merchandise.*

A Florida East Coast utility company purchased a carload of bare and weatherproof wire and another company in the same state ordered a carload of rubber-covered wire. A new textile mill in northwest Georgia placed orders for motors, transformers, switchboard, feeder regulators, etc., amounting to $40,000 and let a contract for $55,000 worth of wiring. Another textile mill in Georgia is making a two-story addition with about 10,000 sq.ft. of floor space. Orders for the electrical equipment for this addition, which will house spinning frames and looms, will be placed at a later date. A lumber mill in Tennessee ordered a 100-kw. generator. The federal penitentiary in Atlanta ordered $2,000 worth of motors and $10,000 worth of switchboard equipment. A Georgia town ordered switchboard equipment costing $2,000 and $1,200 worth of wire.

CONSTRUCTION PROJECTS

Board of Water Commissioners, Memphis, Tenn., will receive bids until August 12 for two 625-kva. turbo-generating units,

two 500-hp. boilers, stokers, fans, coal and ash-handling machinery and motor-driven pumping units; also, until August 14, for switchboard, electric traveling crane and other equipment. Tennessee Electric Power Company, Nashville, Tenn., will build an addition to outdoor power substation to cost $75,000. Adams-Millis Corporation, High Point, N. C., has approved plans for an addition to knitting mill to cost over $200,000. Trion Company, Trion, Ga., has plans for an addition to cotton mill to cost $200,000.

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EASTERN

—JULY ACCOUNT HAS OPENED *up with more encouraging inclinations in the Eastern district and is developing some sizable orders for electrical apparatus, despite the dullness of general trade. Advancing demand for varied equipment seems to have come as a result of attractive price levels, and in the midst of a buyers' market, heavy commitments are being made at differentials easily 25 to 30 per cent of what is considered normal.*

—INDUSTRIAL ACCOUNT *continues dormant and the outlook for the next 30 to 60 days indicates a spotty market in that quarter, with iron and steel prospects about the one bright line.*

General Electric Company is furnishing transformers and accessory equipment for construction service in connection with power dam and hydro-electric generating plant of the Emery, Peck & Rockwood Development Company on the Colorado River, near Austin, Tex.; electric-operated pumping machinery will be supplied by the Allis-Chalmers Manufacturing Company. Puget Sound Power & Light Company has placed a contract with the Westinghouse Electric & Manufacturing Company for a 25,000-kva. synchronous condenser with automatic control switching apparatus and accessories. A central station in New Jersey has contracted with a New York manufacturer for switchgear, totaling $35,000. Public Service Electric & Gas Company, in connection with recent commitments for equipment for its Kearny generating plant, is having a steel condenser built that will be the largest welded steel plate unit of its kind, 65,000 sq.ft. surface, to serve a 75,000-kw. turbo-generator to be installed at the station. Sangamo Electric Company has secured such a heavy volume of business for electric meters and allied apparatus during recent weeks that the proposed summer shutdown in July has been canceled.

Electric railway account shows well-sustained activity. J. G. Brill Company has taken a contract for 30 electric railway cars for a traction company in Chile. Another foreign order from Buenos Aires, Argentina, has been secured by the Osgood-Bradley Car Company for twenty electric cars for subway service. Westinghouse Air Brake Company is the successful bidder for air brake equipment for the new electric locomotives recently purchased by the Pennsylvania Railroad and has secured an order totaling about $1,000,000.

CONSTRUCTION PROJECTS

Department of Sanitation, New York, plans large power plant in connection with municipal sewage treatment and disposal plant on Ward's Island, for which plans for first unit are completed, estimated to cost $30,000,000; during a term of years 33 such units are planned, totaling $275,000,000. Standard Oil Company of New Jersey, New York, has asked bids for bulk oil storage and distributing plant at Burlington, N. J., to cost over $100,000. Western Electric Company, New York, has approved plans for two additions to works at Hawthorne, Ill., to cost over $600,000. Somerville, N. J., has authorized underground conduit system for fire alarm service. Department of Public Works, Philadelphia, Pa., will receive bids until July 28 for electrical supplies.

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MIDDLE WEST

—GENERAL BUSINESS *in the Middle West section continues to drift lazily along a well-defined path without any noteworthy improvement being made. The volume of business remains practically the same, with some seasonal slackening noticeable.*

—MAJOR ACTIVITIES *are quietly marking time, proceeding at a low rate of production in some instances.*

Employment, while still considerably below normal, received some stimulation from the starting of a new million-dollar factory by the Western Electric Company and through the speeding up of the building program for the Century of Progress Exhibition. Railroad equipment purchasing has not been resumed to any large extent and maintenance purchasing is decidedly off. Two of the railroads entering Chicago, operating in the Southwest, report a remarkable increase in carloadings. Wholesale and retail trade increased slightly this week.

CONSTRUCTION PROJECTS

Detroit Edison Company, Detroit, Mich., has plans for addition to power substation on Madison Avenue, to cost $60,000. Signal Corps Procurement District, Chicago, Ill., will receive bids until July 21 for storage batteries, minimum quantity 172,900, maximum quantity 395,150 (Circular 1). Garrett, Ind., has plans for an addition to municipal electric light and power plant. Cleveland, Ohio, plans installation of electric power equipment in sewage disposal and treatment plant in East Side district to cost $12,000,000. Minneapolis, Minn., plans coal terminal with electric-operated machinery to cost $200,000.

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NEW ENGLAND

—CONTINUED IMPROVEMENT *in the sale of electrical supplies and apparatus of moderate size is evident in New England. Building construction has gained substantially over this time a year ago and institutional buying is quite active.*

—BETTERMENT WORK *in textile mills at Fall River and New Bedford has been reflected in electrical orders and inquiries are reviving in other industrial circles to a moderate degree. Central-station construction is confined mainly to well considered line extensions.*

One Massachusetts company bought ten carloads of vitreous conduit last week and the Tenney organization contracted for two 1,500-kva., 4-kv. network transformer units for Medford, Mass. Interest is apparent in a steam turbo-generator project for a small central station system which has yet to reach the proposal stage. A Connecticut company is interested in a substation development project, but, on the whole, transmission activities are quiet for the present. The New England power system purchased three 1,000-kva. transformers and another company ordered $8,000 worth of carrier-current apparatus during the past few days. Stone & Webster Engineering Corporation, Boston, is receiving bids at Pottsville, Pa., on electrical equipment for a second anthracite breaker for the Philadelphia & Reading Company, the major items including about 160 motors, control apparatus, switchboards and approximately 2,700 kva. in transformers.

A wiring contract covering about $125,000 was signed for a new laboratory at the Massachusetts Institute of Technology. Construction projects include the following buildings: Recreation building, $200,000; post office at Palmer, Mass., $115,000; post office at New Britain, Conn., $250,000; technical high school at Springfield, Mass., $400,000; alterations in the Boston Public Library, $56,000; newspaper building at St. Johnsbury, Vt.; college buildings at Bennington, Vt., and a school at Brighton, Mass.

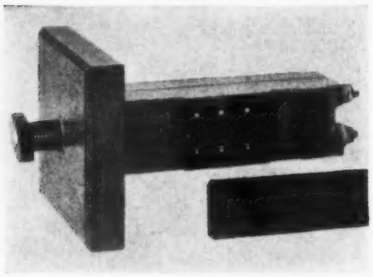
CONSTRUCTION PROJECTS

Post Office Department, Washington, D. C., contemplates new post office station at Boston, Mass., to cost over $1,500,000. Somerville, Mass., is considering municipal automobile service, repair and garage building to cost $100,000. Bureau of Supplies and Accounts, Navy Department, Washington, D. C., will receive bids until July 28 for a quantity of insulated cable and cord for Boston and other navy yards (Schedule 6139).

New Equipment Available

Control Switch Rated 10 Amp. at 600 Volts

A CONTROL SWITCH which consists in general of an operating shaft which actuates a set of single-pole, double-throw main contacts and two sets of three single-pole, single-throw auxiliary contacts has been announced by the General Electric Company. The contacts are mounted within a textolite frame and cover which can be removed



to permit inspection. The main contacts have a continuous rating of 10 amp. at 600 volts and the auxiliary contacts of 5 amp. at 600 volts.

The switch is operated by pulling the handle slightly and turning it 45 deg. clockwise to the "close" position or 45 deg. counter-clockwise to the "trip" position. The main contacts in either position are closed by pushing the handle inward. A cam on the shaft closes the auxiliary contacts and engages a projection in the housing which holds the handle in the 45-deg. position and one set of the auxiliary contacts closed. When the handle is released the main contacts are opened by the action of a spring, but the auxiliary contacts remain closed.

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Manual Across-the-Line Small-Motor Starter

A THREE-POLE, ACROSS-THE-LINE TYPE manual starter for all types of a.c. squirrel cage motors up to 2 hp. is announced by Cutler-Hammer, Inc., Milwaukee, Wis. The features of this starter are its small size, thermal overload relays, all poles trip on overload, twin-break, silver-to-silver butt type contacts, easy operation and a 100 per cent cover interlock. It is 4 1/16 in. wide by 8 1/16 in. high by 3 1/8 in. deep over all, small enough so that it can be mounted directly on a machine near the operator or in any other small space. The thermal overload relays operate directly on the contact mechanism and open all three poles on an overload.

The twin-break contact mechanism gives a double break in each line, to reduce the voltage rise and consequent arcing, when opening the circuit. Silver-to-silver contacts maintain their current carrying capacity and prevent pitting.

The cover interlock prevents opening the inclosing case if the motor is running; the operating lever must first be returned to the "off" position. It also allows padlocking the inclosing case and the operating lever in the "off" position or the inclosing case only can be padlocked.

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Vacuum Contact for 8-Amp. Load at 220 Volts

A DEVICE KNOWN AS THE Burgess vacuum contact, for use wherever a positive, rapid and durable electrical contact is required in circuits handling up to 6 amp. continuous load or 8 amp. intermittently, and up to 220 volts, is announced. It can be operated by hand, by mechanical means, or again by electromagnetic agency such as the usual telephone relay. This contact, developed and manufactured in Germany and now introduced and sold by the Burgess Battery Company of New York and Chicago, is well adapted for use in telegraph and telephone systems, railway signaling and switching systems, fire alarm and burglar alarm systems and other applications where a considerable wattage must be controlled by a minimum of energy.

The principle of the contact is that of the elasticity of a properly designed glass bellows which supports a glass rod actuating the contact in vacuum. The slightest pressure on the protruding glass rod serves to separate the contact members. Being in vacuum, the contact members cannot oxidize or corrode. There is a minimum of arc. The break is instantaneous. The contact can be operated in any position and there is absolutely no movement of the leads.

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ANNOUNCEMENT THAT THE IDEAL WIRE CONNECTOR PRINCIPLE has been applied to the thread lug, wire-threading terminals is made by the Ideal Commutator Dresser Company, Sycamore, Ill. The Ideal thread lugs are made of high-grade bronze and the contact surfaces are ground. Rather than have the hole in the shank for soldering, it is threaded on a taper. Since bronze is harder than copper, the lug and threads act as a die. As the lug is screwed onto the bare wire end, a number of full deep threads are formed, and the wire is held so tightly by these self-made threads that in stranded and flexible wire it is necessary to twist it back until the strands fan out and reverse themselves before the lug will screw off again.

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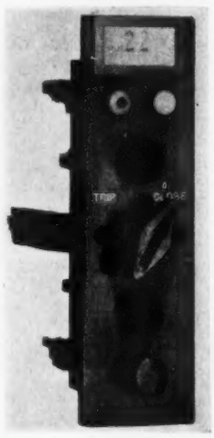
Switch for Miniature Control Switchboards

THE WESTINGHOUSE "Minatrol," developed primarily for miniature control switchboards in order to reduce panel space requirements, reduce cost by eliminating auxiliary apparatus and simplify the methods of control, has been announced by the Westinghouse Electric & Manufacturing Company. The switch is noteworthy for its simplicity of parts, quick make-and-break contacts, bell alarm and signal circuits, and ease of panel mounting. A feature of this switch is its attractive appearance, obtained by the use of a stainless steel front plate.

Small indicating lamps have been developed as part of the miniature control switchboard in the form of Westinghouse "Minalites." These indicators



are of a self-contained molded unit assembly, complete with resistors for use on full-voltage control circuits of 125 or 250 volts. The lens is of a new unbreakable, molded material which gives an intensely bright color over the whole lens.

The Westinghouse "Minatrols" and "Minalites" perform all the functions of circuit breaker control, speed and voltage control, synchronizing, etc., as required on the miniature control switchboards of the modern power station or substation.